HORTICULTURAL ABSTRACTS

Vol. 30, 1960

Prepared by
COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS,
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THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

HORTICULTURAL ABSTRACTS

ERRATA

Vol. XXX.

Abstract 5606.	Text, Line 15.	*For* Betoxon and α-NAA. *read* Betoxon and β-naphthoxyacetic acid.

Vol. XXXI.

Abstract 1954.	Author.	*For* Mathews, C. D. *read* Matthews, C. D.
Abstract 2574.	Text, Lines 9 and 10.	*For* the strength of the solution. *read* the stage of growth of the plant.
Abstract 3580.	Title, Line 5.	*For* **1958** *read* **1959**
Abstract 3660.	Text, Lines 3 and 4.	*For* The plasmodesma started dividing and the protoplasm became separated in the cells. *read* The plasmodesmata began to break and the protoplasm retracted from the cell walls.
Abstract 4571.	Text, Line 2.	For *Peziza vesiulosa* read *Peziza vesiculosa*
Abstract 5425. 5427. 5447.	Author.	*For* Herbert, L. P. *read* Hebert, L. P.

nd Genetics

to 1955. *Rubus* and *Ribes*—A survey.

- Technical Communication 26. Horticulture in the British Commonwealth—An Outline 1958.

Digest No. 1. The Bulk Harvesting of Orchard Fruit.

Digest No. 2. Mist Propagation of Cuttings.

For details see back cover.

HORTICULTURAL ABSTRACTS

Vol. XXX MARCH 1960 No. 1

Initialled reviews not by Bureau staff are by R. J. Garner, R. V. Harris and G. C. White of the East Malling Research Station, E. E. Cheesman of the Agricultural Research Council, R. B. Dawson of the Sports Turf Research Institute, Bingley, G. D. Rowley of the John Innes Horticultural Institution, Bayfordbury, and by D. Akenhead

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EDITORIAL NOTES

CHANGES IN H.A.

The only change of any consequence in this thirtieth volume of *H.A.* is the disappearance of the "Noteds" as a separate category at the end of each section. Here, for some years past, the lists of titles had been growing steadily longer and more indigestible. It was, therefore, decided that the time had come to place these titles in the positions that seemed most appropriate among the general body of abstracts. One relic of the past system remains, however. In the Contents the numbers of Abstracts and Noteds are still shown separately. The former are for the most part informative, and the latter indicative.

Other changes include some minor rearrangement of the Contents, notably the sub-division of some of the longer crop sections such as Vines and Tomatoes. It is hoped that these will help the reader to find certain types of information more readily than hitherto. Finally, the spelling used throughout the text of abstracts (as opposed to their titles) has been anglicized, even in the case of North American authors' summaries. This, may I hasten to add, is not just another example of nationalism rearing its ugly head in an unexpected quarter. Its primary aim is to help the editor and his staff to spell uniformly. No longer will something be coloured in abstract 50 and colored in abstract 51. No longer will some wretched element be labelled in line 1 but labeled in line 5. What bliss! What transportations of joy! What wishful thinking!

NOTES OR BIBLIOGRAPHIES AVAILABLE

Information is available on the 38 subjects noted below. Copies of these have already been sent to the original enquirer and one copy can now be sent gratis to any one address so long as the supply lasts.

Please write direct to us [**NOT** to C.A.B., Farnham Royal] and merely quote the Query File No.

Query File No.	*Subject.*	*Information given.*
3443	Notes and bibliography on **Factors affecting flowering, bud formation and development in lilac, with special reference to its failure to flower in warm regions and to forcing it under glass in cold countries**	2 pages notes + 11 references
3445	Annotated bibliography on the **Use of temperature sums for determining the time of flowering and maturity in fruit and vegetables**	37 references
3445a	Annotated bibliography on the **Pre-forcing cold requirements of certain vegetables and ornamental plants**	11 references
3447a	Abridged translation of Dutch article by van der Knaap in *Bergcultures*, 1954, **23**: 421-5 on **The relation between bean size and growth of cocoa plants**	3 pages
3447b	Abridged translation of Dutch article by van der Knaap in *Bergcultures*, 1956, **25**: 27-33 on **Production data on clonal cacao**	6 pages
3449a	Annotated bibliography on **Burley tobacco** (*N. tabacum*) **growing conditions and varieties**	3 pages
3449b	Annotated bibliography on ***Nicotiana rustica*** (**Nicotine tobacco**) **growing conditions and varieties**	4 pages
3449c	Notes and bibliography on **Quinine** (***Cinchona*** **spp.**) **growing conditions and varieties**	2 pages + 8 references
3450	Bibliography on **Virus diseases of horse-radish**	13 references
3452	Annotated bibliography on the **Drying of cacao beans**	31 references
3455	Annotated bibliography on the **Use of fertilizer lances in the nutrition of deciduous tree fruits**	13 references
3465	Notes and bibliography on **Pre- and post-planting treatments of cucumber affecting flowering and fruiting**	4 pages + 41 references
3480	Bibliography on **Fruit and flower thinning by chemical sprays**	232 references
3490	Bibliography on the **Breeding, genetics and cytogenetics of *Delphinium***	55 references
3491	Notes and annotated bibliography on **Petroleum by-products causing air pollution and their effects on plants (with particular reference to the smog problem in the Los Angeles area)**	2 pages + 35 references

Query File No.	*Subject.*	*Information given.*
3498	Annotated bibliography on **Velvet beans (*Stizolobium* and *Mucuna* spp.)**	41 references
3501	Notes and tabulated data on the **Mineral composition of cacao leaves**	7 pages
3503	Notes and annotated bibliography on the **Problem of "blueing" hydrangeas**	1 page + 25 references
3504	Annotated bibliography on the **Transport, storage and packing of bananas prior to shipment**	98 references
3505	Notes and bibliography on **Recent studies on the application of trace elements to apple trees**	2 pages + 37 references
3508	Bibliography on the **Cold storage of softwood cuttings of ornamental plants (chiefly carnations and chrysanthemums)**	11 references
3510	Annotated bibliography on **Recent advances in rose research**	106 references
3513	Annotated bibliography on **Growth substances used to induce fruit set or parthenocarpy**	234 references
3515	Notes and annotated bibliography on the **Use of vitamins as plant foods or stimulants**	2 pages + 82 references
3520	Annotated bibliography on **Phosphorus in the nutrition of tobacco**	41 references
3541	Notes and bibliography on **Roses grown for their essential oils**	5 pages + 40 references
3542	Annotated bibliography on recent work on **Slug control**	20 references
3543	Notes and bibliography on **Bitter pit, 1935-1958**	2 pages + 71 references
3544	Notes and bibliography on **Strawberry growing in subtropical and tropical regions**	1 page + 34 references
3545	Annotated bibliography on **Rose hips as a source of fruit juice and vitamins**	49 references
3558	Annotated bibliography on **Vegetative propagation in plantation and other crops**	37 references
3580	Annotated bibliography on the **Culture of digitalis as a medicinal plant**	26 references
3584	Bibliography on **Russeting in apples**	27 references
3589	Annotated bibliography on **Woolliness in cold-stored peaches**	27 references
3591	Annotated bibliography on **Onion set size as a factor affecting bolting**	6 references
3598	Bibliography on the **Cultivation and harvesting of castor beans**	94 references
3599	Bibliography on **Methods used for forcing various lily species**	35 references
3616	Notes and bibliography on the **Use of nitrogenous fertilizers on peas and beans**	1 page + 21 references

SALIENT ITEMS, Vol. 30, No. 1.

ENVIRONMENT

Physical micro-climatology:—Once upon a time a biologist was either a botanist or a zoologist. Then he became (or tried to become) a chemist. Now without doubt he must become a physicist, and for aught I know may never again live in quite such happy ignorance hereafter (1430).

Temperature:—A survey conducted with the aid of a mobile thermometer has established that the minimum temperature at different altitudes is the most important limiting factor in the successful cultivation of various tree fruits in the Summerland district of British Columbia (123). Both vine flowering and melon seed emergence are influenced by temperature sums (350, 655). Chilling can enhance runner production in strawberries (314) and flowering in roses (1057) and may cause *Prunus* seedlings to flower in their second year (1099).

Frost:—The problem of assessing winter hardiness is complicated in strawberries by differences between clones of a single variety (301), and in olives by differences between trees of different ages (1202). In young apple trees growth failure following frost may sometimes be due solely to root injury (179). In cabbages infiltration of the leaves with sugars may enhance frost hardiness (633).

Soil waterlogging and aeration:—Citrus trees may tolerate prolonged flooding in winter but not in summer (1139). With peas inadequate soil aeration depresses nutrient uptake (688). Oxygen deficiency may cause "disease" in plants (41), but so may oxygen excess (40, 42).

GROWTH AND PHYSIOLOGY

General:—How fast is a tree growing, not in relation to its neighbours, but in relation to the average growth rate of its kind? How often could this deceptively simple question be answered? At least once for one particular hevea clone (1321). How does spacing affect top growth per unit area of ground? Apparently not at all above a certain minimum, at least in tea bushes (1415).

Bark regeneration:—Anatomical studies following scoring in 2 fast- and 2 slow-growing tree species (214).

Flower formation:—The hot-water treatment of sugar cane cuttings appears in one instance to have intensified flower production (1333). In deciduous stone fruit trees defoliation upsets flower bud development, but the nature of the upset depends on the stage of bud development at which the defoliation occurs (219).

Fruit development:—Two papers throw light on the physiological factors involved in early (June) fruit drop (240, 245) and one on the relationship in apples between starch content and mature fruit drop (256). Two nearly-mature avocado fruits have been successfully grafted together, thereby confirming that in fruits of this species cell division continues up to maturity (1114).

Photoperiod:—With species that become dormant in short days very brief exposures to light during the night may cause growth to continue (1068, 1069). Where a plant is subjected to photoperiods that are shorter or longer than those occurring in its natural habitat, the normal diurnal photosynthetic rhythm may cease (43).

Growth substances in plants:—Papers that provide information on this subject include 66, 67, 72, 220, 221, 312 and 716. In addition, fatty alcohols showing growth-promoting activity have been isolated from tobacco (844).

Growth substances applied to plants:—Assuredly no other growth substances have shown so much promise and so little practical fulfilment as the gibberellins; yet the promise remains to tantalize us (e.g. 73, 81, 222, 603, 691). Its predecessor in popularity, maleic hydrazide, though not without its unsolved problems, has various practical uses (e.g. 838, 840-843). Among other compounds of possible interest are a growth reducer known as Carvadan (1097), and a growth promoter extracted from aphids (476).

Irradiations:—Various forms of ionizing radiation are being used to influence the germination and growth of plants (597, 686, 1368), to hasten fermentation in tea and tobacco (1425) and to extend the life of stored fruits (294, 378). One practical result of ultra-violet irradiation has been the production of a high yielding mushroom culture (708).

MACHINERY, BUILDINGS AND EQUIPMENT

Machines and tools:—Once again the scene is dominated by mechanical devices for harvesting and handling crops, among them machines for harvesting fruit (259, 267), beans (681) and sugar cane (1402-1404), for threshing green peas (696) and castor beans (948), for washing apples (266) and for drying tobacco (892, 894, 895), hops (940), tulip bulbs (1031) and copra (1259, 1260). Other items mentioned include a water-jet apparatus for making post or plant holes (363), a pea seed drill (687), a hot-air oven for treating sugar cane setts (1377), a sprayer-duster (1396), a low-pressure, twin-fluid atomizer (1466), and, for propagation purposes, scissors for taking cuttings (22) and mist control devices (25, 26).

Buildings and their equipment:—Greenhouses and frames (16-21, 1463), a mobile packing shed for pineapples (1313) and fruit stores (273, 277).

Research apparatus:—Another controlled-environment cabinet (106), portable chambers for introducing radioactive CO_2 into apple leaves (109), apparatus for determining soil moisture (110) and micro-climatic data (108, 421) and an instrument for measuring the firmness of brussels sprouts (625).

METHODS, PRACTICAL AND EXPERIMENTAL

Handling crops:—The advent of the harvesting machines and equipment referred to above and in earlier numbers of *H.A.* has naturally led to a spate of papers describing their use. On this occasion the crops represented are deciduous fruits (260-265), tomatoes (798) and citrus (1180-1182). The latest fruits to be bulk- or jumble-packed in cartons are plums (272) and tomatoes (799).

Experimental techniques:—In addition to methods described under this heading (89 onwards) and under the heading "Tissue culture" (82 onwards), there are accounts of a test for growth-substance activity (548), of the use of fluorescent materials in spray liquids (1229) and of X-ray photography to determine insect infestation in coffee beans (1284).

Analytical methods:—For several nutrient elements (94-96, 205, 856, 857), for various organic compounds (97-100, 279, 847, 848, 860, 861, 865, 1175), for various pesticides (102-105, 519, 943) and for gibberellic acid (101).

Statistical design and analysis:—The main section on this subject (113-117) is supplemented by papers describing trials on cabbages (627), coconuts (1249, 1250) and sugar cane (1355).

NUTRITION

General:—In biennial-bearing apple trees there are biennial fluctuations in the chemical composition of the leaves (199). Tomato plants show two distinct periods of accelerated nutrient absorption during their developmental cycle (779). In vines an application of NPK may produce changes in sap composition within 2 days, but these changes may no longer be evident a few days later (356). Of general interest are a book describing research on the nutrition of ornamentals in Germany (1443) and a detailed account of fertilizer-fruit storage trials on apples in New Zealand (198).

Phosphorus:—So many factors influence P uptake by plants that it is tempting to speculate whether any plant ever really manages to obtain the optimum amount of P throughout its life (581, 689, 699, 745, 776). Once inside the plant P occurs in various forms (1328). In citrus trees it may encourage branching, depress the growth of feeder roots and increase the top : root ratio (1147, 1150).

Excess salts:—The conductivity of the soil solution provides a useful guide to the tolerance of different greenhouse ornamentals to heavy dressings of NPK (975). Where the irrigation water available for date palms is very saline, heavy applications may be a safer proposition than light applications (1188). Where irrigation water contains excessive amounts of both Cl and B, some citrus rootstocks exclude one element and some the other element (1153).

Minor elements:—Dissolved, but not adsorbed, B is beneficial to beans (672). In tomatoes root growth is influenced rapidly by changes in B supply interacting with light (781). For vines both Al and Cr appear to be useful (360, 361).

PLANT PROTECTION

Fungi and bacteria:—Irrigation water may spread some *Phytophthora* species but not others (1117, 1162). Some, but not all, green-manure crops may encourage biological control of *Rhizoctonia* (676). The latest instalment in the *Verticillium* syndrome story suggests abnormal growth-substance production by invaded tissues (792). Chlorogenic acid re-appears as a defence mechanism, this time in relation to a bacterium (875). The enzyme chitinase emerges as a destroyer of *Venturia* and other fungi (427).

Viruses:—There is, so far as we know, no truth in the rumour that the next sub-division of the biological sciences now only awaits a decision as to whether it should be termed vironematology or nemativirology (402, 447). Shades of Cleopatra (or was it Poppaea or Sheba?), milk is once again with us, this time for ablutions (753).

Insects and mites:—Mites may halve apple yields in the year following infestation (456). The fungicide captan may encourage mites to multiply (454), or, if you prefer it the other way, it may not encourage them to multiply (461). Endrin seems to be the current answer to the blackcurrant gall mite but not when it is applied at the traditional time for spraying against the mite (462, 463). Insecticide-acaricide sprays at present held in high regard include ethion-oil and Phostex-oil (470, 471, 506, 509).

Application of chemicals:—Spray drift can be reduced by applying invert emulsions with the right types of nozzle (525, 538, 540), or of course it can be eliminated by injecting or implanting systemic chemicals into tree trunks (521, 1233). Where root vegetables are treated with insecticides at the time of sowing, the method of application may affect the residues present in the harvested crop (734-736).

Effects of chemicals on plants:—Good effects, all relating to apples, include fruit thinning with the aid of Sevin (248), enhanced growth and yields following the use of Niacide (423) and better fruit colour following the use of Tuzet (249, 250). Bad effects include reduction in fruit set in apples caused by several fungicides (516), tumescences in hemp plants caused by BHC (925), the inhibition of root growth in cucumbers caused by antibiotics (650), and damage to citrus by swede, yes swede, extracts being tested against a nematode (1164).

Wounds:—In brussels sprouts wound healing is accelerated, and rotting reduced, by supplying adequate potash (626). In sugar maples sap yields can be much increased by placing paraformaldehyde pellets in tapping holes (967). A new pruning wound paint for citrus is described in 1145.

Codifying herbicides:—A system of decimal classification is proposed (530), but will this really help people who are still trying to work out how something once called, let us say, ZUB 4421X became known as Sloshem and yet should really be referred to as 2,4,5,6-BF?

PROPAGATION

Seeds:—With strawberries the best seeds come from the fattest part of the fruit (303) and with carrots from the primary umbel (732). What happens inside cherry seeds during after-ripening is revealed in 171. Having accepted the rather horrible term "after-ripening", it is but one small step down the slippery slope to coin the expression "after-after-ripening" to describe a process that seems beneficial to apricot seeds (170). When mucilaginous salvia seeds are sown in the soil calcium cations may retard water penetration into the seed, but some of these cations are adsorbed when the seeds are mixed with damp sand (918). For those in search of something more substantial, a paper on the effects on environmental factors on the "germination probability" of tobacco seeds can be confidently recommended (809).

Cuttings:—Among publications on mist propagation there is a booklet (1439) and our own Digest No. 2 (1444). In olives the rooting ability of cuttings seems to depend on the presence or absence of a continuous sheath of pericycle sclerenchyma (1197). For ornamental apples a technique is described whereby juvenile shoots can be obtained to provide cuttings which root easily (1091). For pear cuttings two shots of hormone may sometimes be better than one (169).

MISCELLANEOUS

Astaxanthin:—A new flower pigment (982).
Destruction:—Of tree stumps by chemicals (132, 442).
Economics:—A mixed bag (1, 27, 972, 1052, 1269).
Fumes:—From greenhouse varnish damaging plants (774).
Mistletoe:—No longer just mistletoe, except presumably to druids and young ladies (968).

MISCELLANEOUS.

General.

1. SANGERS, W. J.
Bedrijfsstructuur en elektronische rekenautomaat. (**The structure of holdings and the electronic computer.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1959, **22**: 378-89, 398.

The determination of the exact structure of a holding has a qualitative side (the range of crops suited to the conditions of production of the holding) and a quantitative side (area for each crop, size of holding and of glasshouse area, etc.). The conditions affecting production may be classed according to their capacity for improvement. An electronic computer was used for calculations necessary to examine the conditions in an existing holding, and marked differences were shown between the actual and the calculated maximum possible labour income and net surplus. Another finding was that, if labour on family holdings was increasingly replaced by hired labour, the national range of horticultural products, as well as the structure of the holdings, would change considerably. When there is a favourable ratio between the labour force and (a relatively large) holding size, intensification by increasing the area under glass ceases to be an urgent problem.

2. RUSANOV, F. N.
The largest botanic garden in Central Asia. [Russian.]
Priroda, 1959, **48**(7): 61-4, bibl. 1, illus.

In Tashkent, Uzbekistan.

3. BIAŁOBOK, S.
Dendrology in Poland.
[*Mimeo. Publ.*], undated, pp. 16, illus.

A brief historical account of Polish work on the botany, breeding and ornamental uses of trees and shrubs, with a list of institutes where such work is now in progress.

4. IRVINE, F. R.
Bibliography of wild food plants of United States Indians.
[*Publ.*] *Smithsonian Instn Bur. Amer. Ethnol., Washington* **SIL-231**, 1959, pp. 28.

Briefly annotated bibliography of 264 references.

5. ŠAVROV, L. A.
On the nature of fasciation. [Russian.]
Bot. Žurnal, 1959, **44**: 500-5, bibl. 30, illus.

Causes and types of fasciation are discussed.

Climatic factors.

(*See also* 618.)

6. BULTOT, F.
Étude statistique des chutes de grêle au Congo belge et au Ruanda-Urundi. (**Statistical study of hail storms in the Belgian Congo and in Ruanda-Urundi.**)
Commun. I.N.É.A.C. Bur. climat. **17**, 1959, pp. 43, bibl. 49, illus.

The report includes a review of hail-prevention measures adopted in Europe, but the author considers them unsuitable for introduction to either of the tropical regions concerned.

7. EIDG. KOMMISSION ZUM STUDIUM DER HAGELBILDUNG UND HAGELABWEHR.
Grossversuch III zur Bekämpfung des Hagels im Tessin. 2. Versuchsjahr. Tätigkeitsbericht Nr. 11, 1958. (**Eleventh annual report on the large-scale trials on the prevention of hailstorms in the Ticino [Switzerland] for 1958, second year of trial III**), 1959, pp. 105 +6 maps. [Italian, French and English summaries 3-3½ pp. each.]

The data collected in the second year of trial III, even if taken in conjunction with those of the first year, are still insufficient to allow any conclusions to be drawn on the effectiveness of the ground generator method of preventing hailstorms. It appears, however, that the AgI generators have tended to increase rainfall in the northern part of the test area. [For previous report see *H.A.*, 29: 228.]

8. DE'ROSSI, F.
La lotta antigrandine nel decennio 1949-1958. (**Protection against hail in the decade 1949-1958.**)
Ital. agric., 1959, **96**: 671-82, bibl. 21, illus.

Cheddite rockets have proved expensive and unsatisfactory. Experiments with rockets containing sodium chloride and a small explosive charge are recommended. Ground generators, such as are used for inducing rain, might be used with advantage before the precipitation begins, thereby reducing the amount of hail to be dealt with by rockets.

9. ROSINI, E.
Grandine ed antigrandine. (**Hail and the prevention of hail storms.**)
Ital. agric., 1959, **96**: 922-4.

A critical reply to the article by De'Rossi [see preceding abstract], pointing out recent evidence in favour of the use of rockets for causing hailstones to disintegrate while falling.

10. SARRICA, O.
La grandine; potrà l'uomo vincerla? (**Will man succeed in conquering hail?**)
Ital. agric., 1959, **96**: 368-89, bibl. 14, illus.

Prevention by seeding clouds with silver iodide and various hygroscopic chlorides discussed.

11. VAN RHEE, J. A.
Windbeschutting van cultuurgewassen, vooral onderzocht voor fruit. (**Wind protection for growing crops, particularly for fruit.**) [English summary 5½ pp.]
Meded. Inst. toegep. biol. Onderz. **43**, 1959, pp. 74, bibl. 46, illus.

Some of the work reported in this article has already been abstracted [see *H.A.*, 28: 230]. Where windbreaks were established, the highest yields of apples and pears were found at a distance of about 3 h (h=height of windbreak). With north-south windbreaks (10 m. high) the most profitable distances between windbreaks were 4–6 h for apples and 4 h for pears. The probable effect of windbreaks on growth and flowering are discussed. Suitable species suggested for windbreaks are *Populus simonii fastigiata* and a variety of *P. berolinensis*. Ripening of Jucunda and Deutsch Evern strawberries was advanced when windbreaks were used. At 3 h from the windbreak Deutsch Evern could be picked almost 7 days earlier, and Jucunda 3 days earlier, than with unprotected plants. A positive effect of a windbreak was also observed with lettuces and carrots.—Proefst. Fruitteelt, Wilhelminadorp.

12. KAISER, H.
Die Strömung an Windschutzstreifen. (**Air currents in shelter belts.**) [English summary 42 lines.]
Ber. dtsch. Wetterdienst. **53**, 1959, pp. 36, bibl. 64, illus.

Chiefly an analysis of the leeward flow.

13. QUEENSLAND DEPARTMENT OF AGRICULTURE, HORTICULTURE BRANCH.
Windbreaks to protect your crops.
Qd agric. J., 1959, **85**: 334-7, illus.

Trees commonly used for windbreaks for vegetables and tropical fruits in Queensland are: *Pinus taeda* and *P. elliottii*; *Callitris glauca*, *C. rhomboidea* and *C. columellaris*; *Tamarix aphylla*; *Eucalyptus citriodora*, *E. tereticornis*, *E. microcorys* and *E.*

grandis. Where space is limited cow cane and some varieties of banana can be used.

14. Conway, T.
Pussy willow for orchard shelter.
N.Z. J. Agric., 1959, **98**: 596, illus.

The author considers *Salix caprea* to be suitable for shelter belts on account of its rapid growth and ease of establishment.

15. Wasicky, R.
Durch Regen bewirktes Auswaschen von Vitaminen C und anderen Substanzen aus oberirdischen Pflanzenorganen. **(Leaching by rain of vitamin C and other substances from above-ground plant organs.)**
Sci. pharm., 1958, **26**(1/2): 100-3, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 31,309.

During experiments performed mostly with *Rhododendron indicum*, it was observed that much ascorbic acid was lost from the leaves during rainy periods. It is assumed that ascorbic acid is excreted by the leaves and washed off by rain.

Greenhouses, frames and cloches.

(*See also* 1011, 1463.)

16. Nisen, A.
Contribution à l'étude des propriétés des matériaux de recouvrement des constructions horticoles et des conséquences de leur utilisation. **(Contribution to the study of the characteristics of covering materials for horticultural constructions, and of the effects of using them.)**
Bull. Inst. agron. Gembloux, 1959, **27**: 222-56, bibl. 57.

The ideal horticultural glass or glass substitute should transmit the maximal amount of solar radiation of wavelength 2μ or less, and should effectively exclude that of longer wavelength.

17. Hamm, R.
Loss of light does not matter.
Grower, 1959, **52**: 594-5.

Results obtained with plastic films for frames and cold houses at the Technical University, Munich, are outlined.

18. Hahn, E.
Der neue Elektro-Schwefel-Nebler. **(A new electrical apparatus for dispensing sulphur vapour.)**
Gartenwelt, 1959, **59**: 298, illus.

The small, electrically-operated apparatus described, named Sulfix, is suspended from the roof of a glasshouse and dispenses sulphur vapour over an area of 80–120 sq. m., using only 70 watts per hour. It is noted that a rose grower prevented the incidence of mildew in his houses by this method and that the apparatus may also be used for the production of nicotine vapour.

19. Waggoner, P. E.
Protecting plants from the cold. The principles and benefits of natural shelters.
Bull. Conn. agric. Exp. Stat. **614**, 1958, pp. 36, bibl. 22, illus.

The frost protection provided by an unheated plastic row-covering was found to be 2–5° F. Heating frames to 20° F. above the average minimum temperature outside required about 5 kw. hours or 16 B.T.U. per square foot per month. In both heated and unheated shelters very small differences in heat losses were shown by various plastics with large differences in ability to absorb outgoing radiation. Studies are also reported on other factors in the "energy balance" of plastic shelters, including conduction of heat from the soil, convection exchange with the air outside, condensation and evaporation. The use of unheated plastic shelters increased the yield of early tomatoes in a cool spring and decreased it in a warm spring. The probability of benefit or harm resulting from the use of unheated shelters over early tomatoes is estimated for 4 climates in the U.S.A.

20. Jackson, A. A.
The eco-climatology of Dutch lights.
Weather, 1959, **14**: 117-23, 155-62, bibl. 23, illus.

Part I. Meteorological assessment. The results obtained in a study of the temperature variations under double-span Dutch lights at Wye College, Kent, in the winter and spring of 1953/4 are given. The greatest protection was afforded on clear cold nights following warm cloudless days, the least on mild, cloudy, windless nights after dull days. The maximum temperature difference observed between air minima under the lights and in the open air was 5° F. *Part II. The effect on growth.* The limited protection against frost afforded by the lights was found to be sufficient for lettuce. Lettuce, however, could be severely damaged by the high temperatures under glass. The growth retarding "end" and "side" effects could be minimized by reducing the height of the base boards and lowering the soil level in their vicinity. The date of cutting for autumn-sown lettuce was found to be correlated with the accumulated day temperatures of February but of no other month. Ventilation improved the keeping quality of the crop after cutting, but retarded growth and increased water requirements. Snow cover increased the minimum air temperatures in the frame, and bronzing was noticed in uncovered frames during severe weather. Reed mat covers were beneficial against frost but involved high labour costs. Strong winds reduced air temperatures inside the lights, but nevertheless the protection they afforded against wind damage was appreciable.

21. Brookfield, S. H.
The cloche that slides like a curtain.
Grower, 1959, **52**: 300-1, illus.

Lengths of polythene sheeting, 2½ feet long, were erected over top wire supports, with a base wire threaded through a hem at each side. These lengths of polythene may be slid along the wire structure to give easy access for weeding and harvesting. Gaps about 1½ in. wide between each sheet allow permanent ventilation and therefore little condensation.—Somerset Fm Inst., Cannington.

Propagation.

(*See also* 1439, 1444.)

22. Riehl, G.
Stecklingsschnitt mit der Schere. **(Taking cuttings with scissors.)**
Gartenwelt, 1959, **59**: 253-4, bibl. 5.

Cuttings were taken from many ornamental plants, partly by a sharp knife and partly by special scissors. While there was not much to choose between the two methods in the results obtained, the scissors proved much quicker.

23. Oplt, J.
Způsob snadného zakořeňování skleníkových rostlin. **(A simple method of rooting greenhouse plants.)**
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 599-602, illus.

The basal 2 cm. of cuttings are inserted through the holes of inverted 7–8-cm. flower pots, and held in place by moss packing. The pots are sunk 2 cm. deep in moss litter in a tray, under which is arranged a thermostatically controlled low temperature heater. The moss litter is kept adequately moistened. Cuttings of *Ficus*, *Nepenthes*, *Codiaeum*, *Theobroma*, *Cinnamomum*, *Citrus*, *Camellia* and *Annona* were successfully rooted at 28–30° C. by this method. To speed up rooting IBA or IAA can be applied to the cuttings.

24. Blommaert, K. L. J.
Root cuttings successfully under water-mist.
Fmg S. Afr., 1959, **35**(6): 36-7, illus.

The mist-propagating unit at Stellenbosch is described.

25. Templeton, H. M., Jr.
How to control mist for cuttings.
Making a circuit for mist control.
Don't be afraid of a mist recorder.
Grower, 1959, **51**: 728-9, 849-51, 1049-51, illus.

In these 3 articles accounts are given of the construction of an electronic leaf (a glass surface is preferred) [see also *H.A.*, 28: 2142 and 29: 1661], the relay system and a mist recorder, as used by Stark Brothers of Louisiana, Mo.

26. Germing, G. H., and Reynaert, E. E.
Elektronische taster voor automatische waterverneveling. **(An electronic leaf for automatic misting.)** [English summary 8 lines.]
Meded. Dir. Tuinb., 1959, **22**: 390-1, bibl. 4, illus.

A new electronic leaf is described, whose action is not liable to be affected by deposits of dirt or salts. It consists of 2 platinum electrodes connected by a piece of black cotton cloth, which may be easily and regularly replaced. The moisture condition of the cotton regulates the position of the magnetic valve, which operates the mist unit.—I.T.T., Wageningen.

Irrigation and mulching.

27. Kottke, M. W.
Capital and labor efficiency in irrigation.
Bull. Conn. agric. Exp. Stat. **345**, 1959, pp. 18, bibl. 2.

It is stressed that when an irrigation system is installed labour requirements increase, and careful costings must be made to ensure that the increase in labour plus capital outlay are best employed in this form. On high value crops, such as tobacco and lettuce, a 5–10% response to irrigation proved profitable, whereas on forage crops a 20–30% response was necessary to give an adequate return. On the other hand, costs of operation were greater on the more remunerative crops.

28. Robertson, G. W., and Holmes, R. M.
Estimating irrigation water requirements from meteorological data.
Publ. Canada Dep. Agric. Res. Branch **1054**, 1959, pp. 11, bibl. 5.

29. Coulthard, T. L., Wilcox, J. C., and Lacy, H. O.
Screening irrigation water.
[*Publ.*] *Agric. Engng Div., Univ. B.C.*, **A.E.6**, 1959, pp. 14, illus.

Five open gravity and 3 pressurized screening systems for the removal of floating trash, weed seeds and suspended solids are described. The overpour weed-type screen with a settling-box is considered to be the most desirable.

30. Honma, S., and others.
Soil and air temperature as affected by polyethylene film mulches.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 834-42, bibl. 7, illus.

Soil temperatures at a depth of 5 in. averaged 2·5° F. higher under a black polythene cover than in bare soil, and the air temperature ¼ in. above the soil at 4–6 a.m. averaged ½–1° higher. Night temperatures also were higher under the films, and, although soil surface temperatures in day time were lower under polythene than those of bare soil, the temperatures of the air beneath the films averaged 10–30° higher than those of the outside air during daylight hours.

Nutrition.

31. Kick, H., Voss, N., and Sappok, B.
Untersuchungen über die Verfügbarkeit der Pflanzennahrstoffe N, P und K in Müll- und Müllklärschlammkomposten. **(Studies on the availability of the plant nutrients N, P and K in composts from town refuse and sewage sludge.)** [English and French summaries ½ p. each.]
Landw. Forsch., 1959, **12**: 97-110, bibl. 9.

Cabbages and oats were used in container trials.

32. Emmert, F. H.
Loss of phosphorus-32 by plant roots after foliar application.
Plant. Physiol., 1959, **34**: 449-54, bibl. 14.

Losses of P^{32} through plant roots to graded P solutions, in both long (7-day) and short (50-min.) period experiments, occurred as an exponential function of the ambient P concentration, being greatest in the first 5 min. and decreasing exponentially with time. Loss to demineralized water was greater than to tap water. Beans were used for the experiment.—Univ. Conn., Storrs.

33. Schütte, K. H., and others.
Trace element problems in nature.
[*Publ.*] *Univ. Cape Town*, 1959, pp. 55, bibls, illus.

A symposium, which includes a paper entitled "Trace elements in plants" by W. A. Roach.

34. Hewitt, E. J.
The metabolism of micronutrient elements in plants.
Biol. Rev., 1959, **34**: 333-77, bibl. pp. 8.

A review, with special reference to molybdenum and to the relationship between micronutrients and enzyme activity.

35. Dobroljubskij, O. K.
The effect of some little-studied microelements on plants. [Russian.]
Fiziol. Rast., 1959, **6**: 550-9, bibl. 27.

Effects of Ti, V, Cr, Co, Ni, Cd and Hg on crops, including vines, are discussed.

36. Tonani, F.
Ricerche sulla nutrizione minerale delle piante della regione borifera toscana. **(Studies on the mineral nutrition of plants in the boron-rich region of Tuscany.)** [English summary ½ p.]
Nuovo G. bot. ital., 1957, **64**: 641-72, bibl. 27, illus., [received 1959].

A spectrographic method of determining plant B is described, and B contents ranging from 2,830 p.p.m. in *Calluna vulgaris* to 14 p.p.m. in *Cerastium* sp. were recorded from applying this method to numerous wild plants of the region in question. In spite of the high B content of the soil, B toxicity was rare, and only appeared where a major-nutrient deficiency existed, e.g. Ca deficiency in *Arundo donax*, *Clematis vitalba* and bracken (*Pteridium aquilinum*), and probably P deficiency in *Prunus avium*. In many species the B content of the plants was no higher than if they were growing in soil of moderate B status. Analyses for Ca, P and K showed that these elements in the plants were related to B, and that an abnormally high K uptake frequently counteracted B toxicity. There were no symptoms of B toxicity in *Calluna*, which contained 343–2,830 p.p.m. of B, but which showed a remarkable equilibrium between B, Ca and K not observed in any of the other species examined.

37. Stenuit, D., and Piot, R.
Étude des symptômes de carence en manganèse et influence du manganèse sur la croissance de différents végétaux. **(On the symptoms of manganese deficiency and the effect of manganese on the growth of various plants.)** [Flemish, German and English summaries ⅓ p. each.]
Reprinted from *Pédol.*, 1957, **7**: 271-81, bibl. 10, [received 1959].

The crops discussed include several fruits, many vegetables, tobacco and roses.

Physiology and biochemistry.

(*See also* 225, 517, 613, 698, 854, 855, 977, 1044, 1068, 1226.)

38. Coïc, Y.
Compte-rendu des travaux accomplis par la Station de Physiologie Végétale de 1950 à 1956. **(Summary of work carried out by the [Versailles] Plant Physiology Station from 1950 to 1956.)**
Ann. Physiol. vég., 1959, **1**: 7-28.

The following research projects are among those summarized: Mn deficiency and its correction in organic soils; catalase activity in chloroplasts and energy transfer in photosynthesis; distribution of nucleic acids in plant cell constituents and methods of extraction; tissue culture and its application to the study of hormone action, protein synthesis and pathological reactions; enzyme activity; failure of maleic hydrazide to control couch grass. The Station's publications during the 7-year period are listed.

39. Gupalo, P. I.
Definition of concepts and terms relating to plant ontogeny. [Russian, with English summary 7 lines.]
Fiziol. Rast., 1959, **6**: 604-9, bibl. 17.

A discussion of phases in plant development as defined by Lysenko and others.

40. Siegel, S. M., and Gerschman, R.
A study of the toxic effects of elevated oxygen tension on plants.
Physiol. Plant., 1959, **12**: 314-23, bibl. 26, illus.

Excised bean embryos cultured in pure oxygen showed marked reductions in growth and enzyme activity, even at normal atmospheric pressure. Root and root-hair developments were retarded by exposure of dry embryos to 120 atm. for 3 hrs. before culture; elongation of the main axis was not affected. Mature plants (31 species from 28 genera of Angiosperms, Pteridophytes and Bryophytes) were tested for growth-independent, acute effects at 6 atm. oxygen. Exposure for 15 hrs. was generally lethal, but signs of damage were delayed in appearance as much as 24 hrs. after ending treatment. Responses included: discoloration; desiccation and withering of leaves; stem collapse; abscission (*Begonia* and *Euphorbia* especially); and recumbent stem apex. Mesembryanthemum leaves bore droplets of exudate containing proteins and polysaccharides. Ferns were highly resistant, tolerating an oxygen tension of 10 atm., that was lethal to all Angiosperm species tested. Bean embryos were protected against oxygen damage by culture in 10^{-4} *M* Co(II) [the divalent form of cobalt] as measured by elongation and water uptake. Protection by Co(II) of pea root tips against X-radiation was compared with its similar effect in the case of oxygen poisoning. The protective effect of Co(II) and cysteine against ultraviolet radiation damage is also noted. The general biological significance of these phenomena are pointed out, especially the parallels which may be drawn between characteristics of oxygen, radiation, and thermal damage and senescent deterioration. [From authors' summary.] Univ. Rochester, N.Y.

41. Bergman, H. F.
Oxygen deficiency as a cause of disease in plants.
Bot. Rev., 1959, **25**: 418-85, bibl. 235.

A review, including soil oxygen requirements of apple, avocado, blueberry and citrus.

42. Norris, W. E., Jr., Wiegand, J. D., and Johanson, L.
Effect of carbon dioxide on respiration of excised onion root tips in high-oxygen atmospheres.
Soil Sci., 1959, **88**: 144-9, bibl. 25.

Gas exchange was depressed in proportion to the CO_2 concentration, and, in general, the effect was intensified on returning the tissue to pure O_2 after temporary exposure to a 1 : 9 mixture of CO_2 and O_2. The results are discussed in connection with mineral absorption, water absorption and flood injury.—Southw. Texas St. Teach. Coll.

43. Odumanova, G. A.
Diurnal cycle of photosynthesis under artificial light. [Russian.]
Fiziol. Rast., 1959, **6**: 617-19, bibl. 9, illus.

Perilla ocymoides plants, raised in continuous light for 6 weeks, were subjected to 4 different light regimes. Those given 14- and 16-hour photoperiods, similar to the photoperiod of their native habitat, showed a normal diurnal photosynthetic rhythm, whereas those grown in 12- and 24-hour days showed no discernible regularity of CO_2 assimilation.

44. Arnon, D. I.
Conversion of light into chemical energy in photosynthesis.
Nature, 1959, **184**: 10-21, bibl. 82, illus.

Recent evidence is reviewed in support of the theory that the conversion of light into chemical energy is more closely linked with phosphorus metabolism than with carbon assimilation.

45. Marrè, E., and Servettaz, O.
Citocromo C riduttasi in cloroplasti isolati. **(Cytochrome C reductases in isolated chloroplasts.)** [English summary ⅓ p.]
Nuovo G. bot. ital., 1957, **64**: 273-4, bibl. 2, [received 1959].

Studies on the reduction of cytochrome C by chloroplast suspensions in light and darkness, and by enzyme extracts from chloroplasts, and the effects of certain co-enzymes on the process, are briefly reported. The bearing of the findings on photosynthesis is discussed. Spinach and peas were used as sources of chloroplasts.

46. Šul'gin, I. A., and Klešnin, A. F.
On the correlation between the optical properties and the chlorophyll content of plant leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **125**: 1371-3, bibl. 2.

The experimental plants comprised 80 species, including many ornamental and crop plants, which grow in the central belt of European U.S.S.R. Most of them were mesophytes. The transmission, reflection and absorption of light by the leaves was measured, and in most cases these properties were not related to chlorophyll content.

47. Hendricks, S. B., and Borthwick, H. A.
Photocontrol of plant development by the simultaneous excitation of two interconvertible pigments. II. Theory and control of anthocyanin synthesis.
Bot. Gaz., 1959, **120**: 187-93, bibl. 21.

Anthocyanin synthesis, induced by radiation in apple skin [see also *H.A.*, 29: 144] and in red cabbage and turnip seedlings, depends upon continued excitation of the photomorphogenic pigment in spectral regions where absorptivities of both pigment forms are appreciable. The rates of anthocyanin synthesis calculated for absorptivities obtained from measurements of bean stem elongation and germination of lettuce and other seeds are in close agreement with observed values. Photomorphogenic responses arise both from the enzymatic action of the far-red-absorbing form of the effective pigment and from continued photoexcitation. Photomorphogenic responses to radiation in the blue part of the spectrum also arise from absorptions of the photomorphogenic pigment. [Authors' summary. For Part I see *Proc. nat. Acad. Sci.*, 1959, **45**: 344-9.]—U.S.D.A., Plant Ind. Stat., Beltsville, Md.

48. MUSCHIK, M.
Bedeutung von Grösse und Alter der Blätter für die photoperiodische Blüteninduktion. **(The importance of size and age of leaves for photoperiodic flower initiation.)**
Planta, 1959, **53**: 575-94, bibl. 24, illus.

In *Kalanchoe* plants the inhibitory effect on flower initiation of leaves which developed in non-inductive day lengths was removed when the leaves were removed. Response to the photoperiodic stimulus was independent of the age of the leaf but was completely dependent on the size of the perceptive leaf surface.—Inst. Landw. Bot., Univ. Bonn.

49. MACMASTERS, W. J.
Photoperiodic reactions of certain herbaceous perennials under controlled temperature conditions.
Diss. Abstr., 1959, **20**: 44-7, bibl. 11, being *L.C. Card No. Mic.* 59-2297 of 81 pp.

Cold treatment did not prove an absolute requirement for growth of *Valeriana pauciflora*. After cold treatment vegetative growth was more vigorous at a 15-hour than at a 9-hour photoperiod. Non-chilled plants and those given a change of day-length did not flower, but some sparse flowering occurred at both photoperiods following chilling. These results suggest that valerian is a photoperiodically indeterminate plant. Dormancy of *Veronicastrum virginicum* was not broken by either of the above photoperiods in non-chilled plants; vegetative growth after cold treatment was more vigorous at the 15-hour than at the 9-hour photoperiod. The number of flowering plants in the 15-hour photoperiod increased with the length of the pre-chilling treatment, but this was probably an indirect effect. For each cold-treatment the number of flowers was greater in the longer photoperiod. Flowering in continuous illumination was excellent. Studies of flower initiation and development with various photoperiods show that *Veronicastrum* may be classed as an indeterminate plant for flower initiation, but as a long-day plant as regards flowering. Cold treatment was not an absolute requirement for vegetative development of *Eupatorium coelestinum*. After cold treatment few plants flowered in the 15-hour photoperiod, and none flowered in the 9-hour photoperiod, but it is thought that the temperatures were too low for maximum flowering. Under natural conditions the critical photoperiod is not less than 14 hours. It is suggested that *Eupatorium* is a short-day plant, in which the critical photoperiod becomes shorter as the daily temperature cycle rises. Cold treatment, although not an absolute requirement for the vegetative development of *Aster cordifolius*, had a favourable effect on stem development, and stem elongation became more pronounced as the period of cold treatment increased. Most of the aster plants flowered in the 15-hour photoperiod in the non-treated group and in all the cold-treated groups, but flowering in the 9-hour photoperiod was considerable only when the cold treatment lasted 60 or 90 days. The effects of cold treatment on flowering were probably indirect. It is considered that this species is a short-day plant with a critical photoperiod of 15 hours or more.—Univ. Ohio.

50. KUIPER, P. J. C., AND BIERHUIZEN, J. F.
The effect of some environmental factors on the transpiration of plants under controlled conditions.
Meded. LandbHogesch. Wageningen, 1958, **58**(11): 1-16, bibl. 11, illus.

It was proved that Fick's diffusion law can be applied to the transpiration of detached bean and tomato leaves, and a linear relationship between transpiration rate and light intensity was observed. In experiments with whole bean plants, it was shown that the effect of soil moisture is large under high transpiration conditions and negligible under low transpiration conditions. It may be assumed that the water supply to the shoot affects transpiration, independently of the light intensity, by changing the water content of the leaf, and by changing the diffusion resistance of the leaf by an osmotic reaction of the stomates; this osmotic reaction is independent of the light-sensitive stomatal mechanism. A formula for the expression of transpiration is given.—Lab. Plant physiol. Res., Wageningen.

51. CLOWES, F. A. L.
Reorganization of root apices after irradiation.
Ann. Bot. Lond., 1959, **23**: 205-10, bibl. 23.

Roots [of various plants including *Vicia faba*] were irradiated with X-rays and then fed with (8-C^{14}) adenine at various intervals afterwards to see the effect of the radiation on the sites of DNA synthesis and hence on the behaviour of the meristem. The dividing cells of the meristem may be so badly damaged by the X-rays that they stop synthesizing DNA and dividing. When this happens the root may continue to grow by forming a new meristem. This often arises in the quiescent centre whose cells normally do not synthesize DNA or divide. These therefore form a reservoir of cells which are less vulnerable because of their quiescence, but are able to restart DNA synthesis and division when the normally meristematic cells stop. Because of this reorganization of the apex, it is not legitimate to argue about the behaviour of normal root meristems from chimeras induced by irradiation. [Author's abstract.]—Dep. Bot., Univ. Oxford.

52. Brachet, J., and Six, N.
New observations on the mode of action of ribonuclease on living root-tips.
Biochim. biophys. Acta, 1959, **35**: 580-1, bibl. 7.

Since growth and protein synthesis in onion roots are almost completely inhibited by ribonuclease treatment for 30 min., and since further action of the enzyme has little additional effect, it is concluded that the inhibition of protein synthesis is apparently due to partial breakdown of soluble ribonucleic acid by the enzyme. [For earlier work see *H.A.*, 26: 2376.]—Lab. Morph. anim., Univ. Bruxelles.

53. Smillie, R. M., and Krotkov, G.
Ribonucleic acid as an index of the metabolic activity of pea leaves.
Biochim. biophys. Acta, 1959, **35**: 550-1, bibl. 8.

Except during the very early stage of leaf development, the RNA content of the leaf was indicative of the activities of the major photosynthetic and respiratory energy-producing mechanisms of the leaf.—Queen's Univ., Kingston, Ont.

54. Medvedev, Ž, A.
Modern concepts of protein synthesis in plants.
Izv. Timiryazev. seljsk. Akad., 1959, No. 2, pp. 57-74, bibl. 85.

A review.

55. Vaidyanathan, C. S., and Street, H. E.
Nitrate reduction by aqueous extracts of excised tomato roots.
Nature, 1959, **184**: 531-3, bibl. 18.

Excised tomato root extracts in the presence of added diphosphopyridine nucleotide and flavin mono-nucleotide can effect reduction of nitrate, nitrite, hyponitrite and hydroxylamine. The reduction steps beyond nitrite are activated by manganese. In this chain the hyponitrite reduction step appears to be rate limiting. Roots grown upon ammonium or glutamine have very low nitrate- and nitrite-reducing activities as compared with nitrate- and nitrite-grown roots. A thermolabile system for which ascorbate and iron are co-factors, and which *in vitro* effects nitrate reduction, is also present. [Authors' conclusion.]—Univ. Coll. Swansea.

56. Medvedev, Ž. A., and Šen', C.-S.
The dynamics, localization and metabolism of peptides in plant leaves. [Russian, with English summary ¼ p.]
Biohimija, 1959, **24**: 709-16, bibl. 26.

Application of N fertilizers increased the synthesis of amino acids and peptides in leaves of bean plants grown in sand culture. These compounds were shown to accumulate in the plasmic sap in the treated plants, whereas they remained localized in the intracellular structure in the controls grown temporarily without N. When incomplete enzymatic protein hydrolysates, labelled with C^{14}, were applied to the leaves, peptides were directly incorporated into the synthesized protein, indicating that peptides are protein intermediates in the plant. [For earlier work see *H.A.*, 29: 2054.]

57. Davies, D. D.
Organic acid metabolism in plants.
Biol. Rev., 1959, **34**: 407-44, bibl. 8 pp.

A review of the role of the Krebs cycle and carbon dioxide fixation, and of the metabolism of 18 selected acids.

58. Vickery, H. B.
Effect of light upon the behaviour of citric acid in leaves of *Bryophyllum calycinum* Salisb.
Plant. Physiol., 1959, **34**: 418-27, bibl. 21.

Citric acid in leaves picked at daybreak and exposed to light increased and later decreased. It is thought that malic acid makes a major contribution to citric acid formation, that the reaction is partly reversible and that its direction is controlled by the relative proportions of the 2 substances present. —Conn. agric. Exp. Stat., New Haven.

59. Škol'nik, R. Ja., and Doman, N. G.
Transformations of C^{14} glyceric acid in bean leaves. [Russian, with English summary ¼ p.]
Biohimija, 1959, **24**: 899-903, bibl. 13, illus.

The C^{14} from labelled glyceric acid infiltrated into bean leaves, which were subsequently illuminated, occurred in the aspartic acid, serine and alanine fractions of the chromatogram, these compounds becoming radioactive in succession as the exposure to light increased from 8 to 120 minutes. An appreciable part of the radioactivity, however, was found in high molecular compounds insoluble in alcohol, and another fraction was found in the petroleum ether extract.

60. Stenlid, G.
Inhibitory effects of 2-desoxy-D-galactose upon plant roots.
Physiol. Plant., 1959, **12**: 310-13, bibl. 10.

Root growth was inhibited in seedlings of all plant species tested, including cucumber. The inhibitory effects were intermediate between those obtained with galactose and 2-desoxy-D-glucose, a result which is in agreement with the chemical structure of the sugars.—Roy. agric. Coll., Uppsala.

61. Franke, W.
Über die Biosynthese des Vitamins C. III Mitteilung. Nachweis der Unabhängigkeit der Vitamin-C-Bildung von der Photosynthese (bei *Vicia faba minor*). **(On the biosynthesis of vitamin C. III. Evidence that vitamin C formation is independent of photosynthesis in *Vicia faba minor.*)**
Planta, 1959, **53**: 551-64, bibl. 13.

Ascorbic acid contents in an albino mutant plant of *Vicia faba* were more than ten times higher than the contents in the seeds. Vitamin C synthesis was shown to be related to the content of raw materials, to respiration intensity and to several other external factors; thus photosynthesis had only an indirect effect on its formation. [For parts I and II see *H.A.*, 25: 2411p.]—Inst. Landw. Bot., Univ. Bonn.

62. Hagene, P.
Distribution of ascorbic acid in the leaves of some plants.
Nature, 1959, **184** (Suppl. 5): 284-5, bibl. 4.

Concentration gradients in a single leaf and in a series of leaves or bulb scales on the same plant.

63. Young, J. L., and Varner, J. E.
Enzyme synthesis in the cotyledons of germinating seeds.
Arch. Biochem. Biophys., 1959, **84**: 71-8, bibl. 12.

The activity of protease, amylase and phosphatase was studied in germinating peas. The first named showed no increased activity, but the activity of the others increased greatly. This was shown to represent a net synthesis of enzyme proteins.—Ohio St. Univ., Columbus.

64. Kolesnikov, P. A., Petročenko, E. I., and Zorě, S. V.
The relationship between glycollic acid oxidase and polyphenol oxidase. [Russian, with English summary ½ p.]
Fiziol. Rast., 1959, **6**: 598-603, bibl. 8.

In leaves, including those of tobacco, mint, coriander and kok-saghyz.

65. Martin, J. T.
Investigations on plant cuticles.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 102-6, bibl. 8, illus.

An account is given of work during 1958 on the cuticles of the leaves of apple, tomato, black currant, strawberry, cauliflower, red beet and banana and of the fruits of apple, tomato and black currant. The changing nature of the cuticle and some of the factors influencing its formation are discussed. [Author's summary. For earlier work see *H.A.*, 28: 257 and 29: 14.]

Growth substances.

(*See also* 121, 169, 220-223, 240, 245-247, 252, 312, 313, 326, 338, 603, 675, 691, 700, 716, 739, 747, 810, 946, 1007, 1032, 1048, 1191, 1198, 1369.)

66. Köves, E., and Varga, M.
Comparative examination of water- and ether-soluble inhibiting substances in dry fruits.
Phyton, 1959, **12**: 93-9, bibl. 11.

Water- and ether-soluble inhibiting substances from the dry fruits of 24 species, including ornamentals, vegetables and various other crops, were examined by paper chromatography and bio-assayed with *Papaver* seeds and wheat coleoptile sections. Inhibitors were found in all fruits. All those that have been chemically identified turned out to be phenolic acids or their depsides and polydepsides. Inst. Plant Physiol., Univ. Szeged, Hungary.

67. Fawcett, C. H.
Plant-growth substances and the copper chelation theory of their mode of action.
Nature, 1959, **184**: 796-8, bibl. 9.

Experimental evidence is presented, which does not support the theory that plant-growth regulating activity is explicable in terms of chelation. [See also *H.A.*, 28: 2146k.]

68. Sacher, J. A.
Studies on auxin-membrane permeability relations in fruit and leaf tissues.
Plant Physiol., 1959, **34**: 365-72, bibl. 24, illus.

Experiments are described, which demonstrate the dependence of fruit and leaf tissues on auxin for the maintenance of membrane properties. Auxin treatment delayed permeability changes [see also *H.A.*, 29: 2093e] and permitted respiratory activity to continue. Segments of bean endocarp and leaf slices of *Rhoeo* and *Mesembryanthemum* were used for this work. The possible relationship between permeability changes and senescence of certain fleshy fruits is discussed.—Los Angeles St. Coll., Calif.

69. Cooke, A. R.
The effect of continuous gamma irradiation on the growth hormone content of green plants.
Proc. Okla Acad. Sci., 1955, **36**: 47-8, bibl. 6, [received 1959].

Calendula, *Nicotiana*, *Cosmos* and *Xanthium* were grown in concentric circles around a constant source of gamma rays for about one month and then sampled for auxin analysis. Plants grown at 40 m. from the source were considered normal, but as the distance decreased auxin content fell to a minimum level and then increased. The distance at which the minimum level was reached depended on the species; it was greatest (i.e. the ighest sensitivity was shown) in *Nicotiana*.—kla agric. Exp. Stat., Stillwater.

70. Patten, B. C.
Influence of ammonium phosphate buffers on foliar absorption of organic acids.
Bot. Gaz., 1959, **120**: 137-44, bibl. 9.

he influence of ammonium phosphate buffers on e penetration of 2,4-D, NAA and Endothal into oung bean leaf tissue was studied by measuring nternode growth following treatment. Uptake f these biologically active acids was found to be ompletely independent of their state of dissociaion. The plant responses appeared to be mediated nstead by the buffer anions; $H_2PO_4^-$ enhanced ptake, while HPO_4^{--} inhibited it. This ion ntagonism resulted in growth inhibition which was roportional in magnitude to the concentration ifferential of the ion present in excess. This elationship produced empirical correlations beween percentage internode repression and curves f buffer capacity. [From author's summary.]—Rutgers Univ., New Brunswick, N.J.

71. Takeda, A.
***m*-Nitro- and *m*-trifluoromethyl-aryl acids as plant growth regulators.**
Contr. Boyce Thompson Inst., 1959, **20**: 191-203, bibl. 20.

Sixteen compounds with a *meta* directing group at the *meta* position of the benzene ring as related to phenoxyacetic acid and *N*-phenylglycine were prepared and evaluated for cell elongation activity in the tomato leaf curvature test. The trifluoromethyl group placed in the *meta* position functioned as an activity-enhancing group like the nitro group in the same position. [Author's summary.]

72. MacMillan, J., Seaton, J. C., and Suter, P. J.
A new plant-growth promoting acid-gibberellin A_5 from the seed of *Phaseolus multiflorus*.
Proc. chem. Soc., Lond., 1959, pp. 325-6, bibl. 5.

Isolation and structure of the growth-substance from immature seeds, which yielded 1 mg./kg.

73. Litvinenko, S. N.
The Ukrainian gibberellin, an effective growth stimulant. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **126**: 1368-70, bibl. 9, illus.

Gibberellin, prepared from Ukrainian strains of *Fusarium moniliforme* and identical with Stodola's compound, when applied daily at 0·0025% with a micropipette, induced rapid growth and early flowering in *Nicotiana odorata*, *Callistephus sinensis* and tomato, and advanced the development of privet seedlings. Unstratified seeds of apple, pear and mountain ash, which are normally very slow to germinate, when soaked in 0·02% gibberellin for 24 hours, germinated in 6–7 days, and seeds of dogwood germinated in 14–15 days.

74. Mayer, A. M.
Joint action of gibberellic acid and coumarin in germination.
Nature, 1959, **184**: 826-7, bibl. 10.

Gibberellic acid, at somewhat higher concentrations than those normally used, reversed the inhibition of germination of lettuce seeds caused by coumarin, but the inhibition of subsequent growth of roots and hypocotyls also caused by coumarin was not reversed by GA.—Low Temp. Res. Stat., Cambridge.

75. Maciejewska-Potapczyk, W.
Influence of kinetin, β-indoleacetic acid and gibberellic acid on nuclease activity of bean *(Phaseolus vulgaris)* hypocotyls.
Nature, 1959, **184**: 557-8, bibl. 5.

Kinetin increased the activities of both ribonuclease and deoxyribonuclease in extracts from bean hypocotyls. Its action was enhanced by the presence of IAA. The latter alone had no effect. Gibberellic acid at very high concentrations slightly depressed the activity of both enzymes, otherwise it was without effect.—Rothamsted exp. Stat.

76. Schraudolf, H., and Reinert, J.
Interaction of plant growth regulators in regeneration processes.
Nature, 1959, **184**: 465-6, bibl. 3, illus.

Begonia leaf discs were supplied with 2,4-D, kinetin, gibberellin or combinations of these growth substances. 2,4-D, between 10^{-8} and 10^{-5} g./ml., favoured root formation. Lower and higher concentrations delayed shoot growth for 8 days and for 3–4 weeks or more respectively. Kinetin suppressed the formation of roots, counteracted their promotion by 2,4-D, and abolished the polarity of shoot formation. GA between 10^{-6} and 10^{-5} g./ml. inhibited both root and shoot formation; 2,4-D, but not kinetin, counteracted this inhibitory effect.—Univ. Tübingen.

77. Coulombe, L. J., and Paquin, R.
Effets de l'acide gibberellique sur le métabolisme des plantes. (**Effects of gibberellic acid on plant metabolism.**) [English summary 6 lines.]
Canad. J. Bot., 1959, **37**: 897-901, bibl. 11.

Tomato foliage entirely or partially sprayed with a solution of gibberellic acid showed 1 or 2 hours later a rapid increase in respiration, photosynthesis and transpiration. A maximum rate was reached 5 or 6 hours after spraying and was followed by a rapid decline. Except for the transpiration, which returned to its initial rate, the respiration and photosynthesis of the treated plants remained higher than those of the checks in the limits of the experiments. [Authors' summary.]—Canada Dep. Agric., Ste-Anne-de-la-Pocatière, Quebec.

78. LOCKHART, J. A.
Studies on the mechanism of stem growth inhibition by visible radiation.
Plant Physiol., 1959, **34**: 457-60, bibl. 9.

Exposure of a dwarf pea to a single brief irradiation with red light results in an inhibition of growth which persists for several days. The effect of a series of gibberellin doses on the growth responses of irradiated or dark-grown peas has been determined. In the absence of applied gibberellin the growth of irradiated plants is inhibited compared with those grown in darkness. At saturating doses of gibberellin the irradiated and dark-grown plants are the same height. The proportionate responses of irradiated and dark-grown plants are equal at equal doses of gibberellin. It is concluded that visible radiation probably inhibits stem growth in this species through an effect on the level of endogenous gibberellin. [From author's summary.]—Calif. Inst. Tech., Pasadena.

79. LOCKHART, J. A., AND GOTTSCHALL, V.
Growth responses of Alaska pea seedlings to visible radiation and gibberellic acid.
Plant Physiol., 1959, **34**: 460-5, bibl. 12.

GA reversed the inhibition of stem elongation caused by both low and high intensity light [see also *H.A.*, 29: 28].

80. NICKELL, L. G., AND TULECKE, W.
Responses of plant tissue cultures to gibberellin.
Bot. Gaz., 1959, **120**: 245-50, bibl. 26.

Forty-nine strains of tissue from 25 species of plants have been tested for their growth response to gibberellin at 10 p.p.m. As a group, monocotyledonous tissues were inhibited. There was no apparent correlation between response to gibberellin and characteristics of the tissues, such as the agents inducing proliferation, plant parts from which the tissues were obtained, age of the cultures, or media supporting tissue growth. The growth of a few tissues was promoted, but the most general as well as the most pronounced effect was inhibition of growth, in two cases resulting in death of the tissues. [From authors' summary. For earlier work see *H.A.*, 28: 1052.]—Biochem. Res. Develop. Dep., Chas. Pfizer and Co., N.Y.

81. BOSE, N.
Effect of gibberellin on the growth of pollen tubes.
Nature, 1959, **184**: 1577, bibl. 2, illus.

Germinating pollen of *Pisum sativum* was treated with gibberellin, 3-indoleacetic acid, kinetin and boric acid at concentrations of 0·05, 0·1, 5, 10, 50, 100, 250 and 500 mg./l. GA increased tube growth at 0·05 mg./l. to 7 times that of the control, but had less effect at higher concentrations. Higher concentrations also caused broadening of the tube tips and bursting of the grains. GA had no promoting effect on germination. The other substances tested increased tube growth but not so markedly as GA; nor did the combination of IAA or kinetin with GA improve tube growth. GA, however, stimulated the generative cell to divide, and, in rare cases, the male gametes divided again to produce 4 sperm cells.—Univ. Delhi.

Tissue culture.

(*See also* 38, 40, 55, 80, 476, 1016.)

82. TULECKE, W., AND NICKELL, L. G.
Production of large amounts of plant tissue by submerged culture.
Science, 1959, **130**: 863-4, bibl. 8, illus.

The growth rate of plant tissue cultures is substantially increased through the use of a large-volume carboy system. Aeration is considered to be the most important factor. With this system, yields of a pound or more of tissue can be obtained within 2 weeks. [Authors' abstract.]—C. Pfizer & Co., Brooklyn, N.Y.

83. WEINSTEIN, L. H., AND OTHERS.
Biochemical and physiological studies of tissue cultures and the plant parts from which they are derived. I. *Agave toumeyana* Trel.
Contr. Boyce Thompson Inst., 1959, **20**: 239-50, bibl. 23, illus.

The composition of leaves of *Agave toumeyana* and of a tissue culture derived from the leaves were compared for their relative content of free and combined amino acids, non-volatile organic acids, sugars and nucleic acids. Outstanding differences were found in the content of free and combined hydroxyproline, the ratios of malate to citrate, of ribonucleic to deoxyribonucleic acid and of free glucose, fructose and sucrose. [Authors' summary.]

84. BARNES, R. L., AND NAYLOR, A. W.
***In vitro* culture of pine roots and the use of *Pinus serotina* roots in metabolic studies.**
For. Sci., 1959, 5: 158-68, bibl. 21.

Including a study of techniques for growing isolated roots.

85. BOLL, W. G.
Evidence for negative feedback in the control of ethanolamine biosynthesis in excised tomato roots.
Canad. J. Bot., 1959, **37**: 1071-83, bibl. 30, illus.

The isolation of a clone of excised tomato roots, and the modifications of White's medium necessary for successful culture of this clone, are described. The medium includes pyridoxin. Nutritional experiments are described in which ethanolamine and amino acids, which will partly replace pyridoxin, ere supplied together in the absence of pyridoxin. he results support the hypothesis that exogenous hanolamine leads to the loss of a vitamin B_6 ependent enzyme necessary for the biosynthesis of hanolamine. The results are of incidental interest when considering the use of complex additives (e.g. yeast extract) in culture media, and to the xplanation of toxicity of natural metabolites. From author's abstract.]—McGill Univ., Montreal.

86. Murgai, P.
In vitro culture of the inflorescences, flowers and ovaries of an apomict, *Aerva tomentosa* Forsk.
Nature, 1959, **184**: 72-3, bibl. 6, illus.

Cultural methods briefly described.

87. Reinert, J.
Über die Kontrolle der Morphogenese und die Induktion von Adventivembryonen an Gewebekulturen aus Karotten. **(On controlling the morphogenesis and the induction of adventitious embryos in cultures of carrot tissue.)** [English summary 9 lines.]
Planta, 1959, **53**: 318-33, bibl. 23, illus.

88. Lehner, A., and Nowak, W.
Über das Vorkommen von Bakterien in gesundem Pflanzengewebe. **(On the incidence of bacteria in healthy plant tissue.)** [English and French summaries 18 lines and ½ p. respectively.]
Landw. Forsch., 1959, **12**: 57-70, bibl. 48.

An extensive examination of fruits, seeds, tubers and stems showed that there is no evidence for the presence of bacteria in healthy plant tissues cultured under sterile conditions.—Bayer. Landesanst. PflBau PflSchutz, München.

Experimental techniques.

(*See also* 205, 228, 240, 257, 411, 535, 797, 856, 865, 939, 1284.)

89. Bartels, W.
Die Anwendung der Cordoniermethode bei der Auswertung von Literatur des Gebietes Pflanzenpathologie und Pflanzenschutz. **(The application of a punch-card method for the evaluation of literature in the field of plant pathology and plant protection.)** [English summary ¾ p.]
Z. PflKrankh., 1959, **66**: 627-36, bibl. 14.

Cordonnier's method is recommended for filing references to literature.

90. Volkov, V. Ja., and Selevcev, V. F.
Calculation of the assimilating surface area of cucumber plants. [Russian.]
Fiziol. Rast., 1959, **6**: 619-22, illus.

For the purpose of calculating leaf areas, the author divides cucumber leaves into 3 types, for each of which a formula based on the product of overall length and maximum width is presented.

91. Krochmann, J.
Zur Frage der Strahlungsmessung bei ökologischen Untersuchungen. **(On the measurement of radiation in ecological investigations.)**
Gartenbauwiss., 1958, **23**: 554-60, bibl. 16.

A review, with particular reference to light intensity and the spectral distribution of light.

92. Bergmann, L.
A new technique for isolating and cloning cells of higher plants.
Nature, 1959, **184**: 648-9, bibl. 8, illus.

From callus tissue of tobacco and beans.

93. Zaitlin, M.
Isolation of tobacco leaf cells capable of supporting virus multiplication.
Nature, 1959, **184**: 1002-3, bibl. 3, illus.

A technique for preparing quantities of isolated leaf cells of *N. tabacum* and other plants.

94. Shaker, M. H.
Procedure for the quantitative determination of some major elements in plant tissue material. [Yugoslav, with English summary 7 lines.]
Zborn. Rad. poljopriv. Fak. Belgrade, 1958, **6** (2): 45-54, bibl. 13.

A rapid method for determining N, P, K, Ca, Na and Mg in a single solution.

95. David, D. J.
Determination of calcium in plant material by atomic-absorption spectrophotometry.
Analyst, 1959, **84**: 536-45, bibl. 9.

A method for overcoming interference by P, Al, Na, K and Si.

96. Iismaa, O.
Micro determination of sulphur in plant material.
J. Aust. Inst. agric. Sci., 1959, **25**: 136-8, bibl. 7.

Complete oxidation of methionine is claimed for this modification of Steinberg's method.

97. Roux, L., and Lesaint, C.
Mise au point d'une technique de détermination des acides organiques chez les végétaux. **(Perfecting a technique for the determination of organic acids in plants.)**
Ann. Physiol. vég., 1959, **1**: 83-91, bibl. 12.

Quantitative extraction and separation.

98. Buchloh, G., and Hane, M.
Der Nachweis von Fumarsäure und einigen anderen organischen Säuren in Apfelfrüchten. **(The determination of fumaric acid and of some other organic acids in apple fruits.)**
Gartenbauwiss., 1958, **23**: 507-11, bibl. 18.

99. Kern, H.
Ein Beitrag zur quantitativen Bestimmung von Nucleinsäuren in grünen Blättern. **(On the quantitative determination of nucleic acids in green leaves.)**
Gartenbauwiss., 1958, **23**: 507-11, bibl. 18.

Extraction by concentrated perchloric acid allowed improved recovery of DNA.

100. Pospíšilová, J., Toul, V., and Dupal, R.
Rychlá modifikace metody stanovení provitaminů A v rostlinách. **(A rapid modification of the method of determining provitamin A in plants.)** [English, Russian and German summaries $\frac{3}{4}$ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 583-94, bibl. 15, illus.

Dehydration, extraction and washing of the pigments are carried out in one vessel, and the chromatogram is estimated colorimetrically. Good agreement with the longer, more accurate method is claimed.

101. Zweig, G., and Cosens, G. R.
Residue analysis of gibberellic acid in grapes by bioassay and isotope methods.
J. agric. Food Chem., 1959, **7**: 717-19, bibl. 7.

Bioassay was preferred.

102. Crowdy, S. H., and others.
The translocation of antibiotics in higher plants. 3. The estimation of griseofulvin relatives in plant tissue.
Biochem. J., 1959, **72**: 230-41, bibl. 16.

Methods are described for identifying and estimating griseofulvin and related compounds, the grisans, in both the treating solution and the plant tissues treated. Bean plants (*Vicia*) grown in solutions containing 11 of these compounds were shown to have absorbed an appreciable quantity of them either unchanged or in the form of simple organic metabolites.—I.C.I. Ltd., Akers Res. Labs, Welwyn, Herts.

103. Frehse, H., and Tietz, H.
Quantitative determination of arsenic residues in plant materials.
J. agric. Food Chem., 1959, **7**: 553-8, bibl. 21.

From 1 to 60γ of As per sample can be determined by means of the molybdenum blue reaction.

104. Meagher, W. R., and others.
Colorimetric method for the determination of Dyrene residues in plant material.
J. agric. Food Chem., 1959, **7**: 558-60, bibl. 2.

Microdetermination of the fungicide 2,4-dichloro-6-(*o*-chloroanilino)-*s*-triazine.

105. Barry, D. L., and Lisk, D. J.
Determination of Dyrene in apples by application of the Zincke reaction.
J. agric. Food Chem., 1959, **7**: 560-1, bibl. 4.

About 0·05 p.p.m. of 2,4-dichloro-6-(*o*-chloroanilino)-*s*-triazine can be detected.

Apparatus and various devices.

(*See also* 18, 25, 26, 421, 625.)

106. Hughes, A. P.
Plant growth in controlled environments as an adjunct to field studies. Experimental application and results.
J. agric. Sci., 1959, **53**: 247-59, bibl. 10, illus.

A cabinet, which provides accurate environmental control at low cost, is described in detail. It is simple in design and easy to operate and maintain. The equipment costs about £300 to build and £25–50 per year to run, depending upon the conditions required. The range of conditions available in the cabinet comprises light intensity up to an equivalent of one-fifteenth of full noon sunlight; variations in spectral composition; control of day-length, temperature (10–25° C.) and humidity (50% upwards). The use of this cabinet for experimental studies with *Impatiens parviflora* is described, and the effects of varying single environmental factors is discussed. Intensity, duration and spectral composition of light were the most important factors of the aerial environment affecting growth. —Univ. Cambridge.

107. Elliott, R. F., and French, C. S.
Germination of light sensitive seed in crossed gradients of temperature and light.
Plant Physiol., 1959, **34**: 454-6, bibl. 9, illus.

An apparatus designed for algal studies used successfully to study lettuce seed germination.

108. Winspear, K. W., and Morris, L. G.
Temperature integrating bottles for measuring mean air temperature. [French and German summaries 16 and 14 lines.]
J. agric. Engng Res., 1959, **4**: 214-21, illus.

The device described indicates directly mean air temperature in a thermostatically-controlled heated structure and can be used as an alternative to the integration of records obtained by continuous measurement at many points over long periods of time. It is simple and robust, consisting of a water-filled preserving jar, covered with reflecting foil and fitted with a thermometer; the jar is suspended by strings at each sampling point. The effects of bottle size and different types of radiation shield, as well as the accuracy of the equipment, were assessed in experiments to measure the mean night temperatures in a heated glasshouse. [Authors' summary.]—N.I.A.E., Silsoe, Beds.

109. Abbott, D. L., and Lloyd-Jones, C. P.
The movement of photosynthates in the apple tree: I. $^{14}CO_2$ assimilation technique.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 56-8, bibl. 1, illus.

s a means of introducing $^{14}CO_2$ into the leaves of pple trees growing in the orchard or glasshouse, simple, portable apparatus has been devised. his consists of a Perspex leaf chamber in which known amount of $^{14}CO_2$ can be liberated. For omparing the uptake of CO_2 by different leaves, a rger chamber, capable of accommodating 8 etached leaves, has been designed.

110. Stolzy, L. H., Crabb, G. A., Jr., and Erickson, A. E.
The use of a recording resistance bridge in soil moisture studies.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 768-77, bibl. 9, illus.

he recording Wheatstone bridge enabled the esistance of 16 plaster, soil-moisture blocks to be ecorded in 15 minutes. It did not work satisctorily with nylon blocks. The relative error was % at 1,000 ohms rising to 4% at 10,000 ohms. eterioration of the plaster blocks indicated that heir use should be limited to a short period of easurement.

111. Hodge, W. H.
A permanent label clip for potted plants.
Nat. hort. Mag., 1959, **38**: 181-3, illus.

stainless steel clip has been designed at Longood Gardens, Kennett Square, Pennsylvania, to old standard brass labels on American-type pots.

112. Blumer, A.
(The largest sea-water distillation plant in the world.) [French?]
Industr. Trav. Outremer, 1959, No. 69, from abstr. in *Riv. Agric. subtrop.*, 1959, **53**: 357-8.

n the arid island of Aruba (Dutch W. Indies) the ater supply is almost entirely dependent on a lant distilling sea water, with an output of 10,000 ons per day. This installation has made possible he hydroponic cultivation of tomatoes at approxinately 30,000 plants per ha. The plant and its peration and maintenance are briefly described.

Statistical design and analysis.

(*See also* 627, 1249, 1250, 1355, 1376.)

113. Bliss, C. I.
Periodic regression in biology and climatology.
Bull. Conn. agric. Exp. Stat. **615**, 1958, pp. 55, bibl. 22.

When the variable in periodic phenomena occurs around the clock or throughout the year, but with systematically unequal magnitudes, its underlying pattern can often be expressed logically in relatively simple trigonometric terms. By combining this classical mathematical model with an appropriate statistical analysis, it becomes possible both to describe the periodic trend and to study deviations from its pattern. For example, weather can be separated into its orderly and its random elements, thus making it possible to estimate the probability of occurrence of critical temperatures. The new technique is described in detail, and its application is illustrated with a wide range of biological examples.

114. Nonnecke, I. L.
The precision of field experiments with vegetable crops as influenced by plot and block size and shape. I. Sweet corn.
Canad. J. Plant Sci., 1959, **39**: 443-57, bibl. 11.

For block shapes of 1×6 plots (1 plot long and 6 plots wide) and block shapes of 3×2 plots (3 plots long and 2 plots wide), widening the plots was more effective in reducing variation than lengthening them. However, for block shapes of 6×1 plots and block shapes of 2×3 plots, lengthening the plots was most effective. Estimates of cost were obtained showing the percentage of the total cost that was proportional to the number of plots used and the percentage that was proportional to the total area used per treatment. Optimum plot size for yield and quality studies was found to be one of two basic units (10 ft. by 6 ft., or 20 ft. by 3 ft.). [From author's abstract. For related work on peas see *H.A.*, 29: 2071.]—Canada Agric. Res. Stat., Lethbridge, Alberta.

115. Statistical Branch, I.C.A.R.
Study on uniformity data on pepper.
Statist. News Letter, 1958, **8**(3): 6-7.

In uniformity studies with different plot sizes the number of standards per plot ranged from 1 to 50; respective average coefficients of variation were from 70·83 to 17·22 and the total number of standards required for 5% S.E. from 170 to 800. The decrease in the C.V. as plot size increased was not so marked when the number of standards per plot exceeded 10. The Fairfield Smith equation was $y = 65\cdot15^{-0\cdot3049}$ when y = C.V. and x = plot size. Plot shape had no consistent effect on the C.V.

116. Cunningham, R. K., and Burridge, J. C.
The effect of the yield variability of Amelonado cacao on the design of fertilizer field experiments in Ghana.
J. hort. Sci., 1959, **34**: 229-37, bibl. 14.

Yields of Amelonado cacao grown in Ghana have been analysed in an attempt to assess the minimum requirements for the design of fertilizer field experiments capable of detecting 20% yield responses at the P = 0·05 level of significance. Normal distributions of yield data were obtained by grouping trees, by logarithmic transformation or by a combination of both methods. For single season experiments, coefficients of variability in the range 30 to 60% made replications too high to be practicable. Adjusting data from paired seasons reduced replication to about 12, which was just sufficiently low to make accurate experiments possible. A circular plot technique for use in random cacao is described. [Authors' summary.] —W. African Cocoa Res. Inst.

117. Rosbaco, U. F.
Las pruebas estadísticas para comparaciones entre medias en los ensayos comparativos de rendimiento. **(Statistical tests for the comparisons of means in yield-comparison experiments.)**
Idia, 1959, No. 139, pp. 27-30, bibl. 3.

TEMPERATE TREE FRUITS.

General.

(*See also* 970, 1431.)

118. Comité Nationale de Pomologie [Belgium].
Résumés de Communications. Congrès International de Pomologie, Bruxelles, 1958. **(Summaries of papers [read at] the International Congress of Pomology, Brussels, 1958)**, pp. 63, bibls, illus.

Pomologists from Western Europe contributed to the Congress, and the following are the titles of the papers, all published in French: The nutritional value of fruits, by Dr. Brull; The Common Market and fruit production in Western Europe, by F. Robin; A review of various systems of intensive fruit growing, by G. Perraudin; Some characteristics of fruit production systems in France and their recent evolution, by — Mainie; The rôle of chemical herbicides in bush tree culture, by E. Dermine; Fruit growing as a source of profit, by J. Hiemeleers; Theoretical aspects of pruning fruit trees, by J. H. M. van Stuivenberg; Problems of soil cover in bush fruit growing, by D. W. P. Greenham; Planting systems, by J. Baudewijn; Problems of growing soft fruit, by [H.] Kronenberg; and Observations on the biology and control of apple mildew (*Podosphaera leucotricha*), by W. Kosswig.

119. Connecticut Pomological Society.
Proceedings of the 68th Annual Meeting of the Connecticut Pomological Society, 1958, Berlin, Conn., 1959, pp. 88, illus.

Among the papers read at this meeting were the following: Some research highlights (insect and mite control, spray effects on apple quality, Ca for control of Baldwin spot, the effect of specific insecticides on natural orchard fauna), by P. Garman; Newer apple varieties (worthy of trial in Connecticut), by L. G. Klein; and Production and marketing of apples in Nova Scotia, by C. A. Eaves.

120. Felius, P. M., and Toorenaar, G.
De Proeftuin te Wilhelminadorp. **(The Experimental Orchard at Wilhelminadorp.)** [English summary ¾ p.]
Jversl. Proefst. Fruit. Wilhelminadorp, 1958, pp. 13-22, illus.

In the trial of new apple varieties the behaviour of Close, Stark Earliest, Tydeman's Early Worcester, Ingrid Marie and Lucullus (Cox × Jonathan) is discussed. No differences in yields were found between spindle-bush or hedge systems with Cox and Golden Delicious on M.II. Cox grown as a hedge gave higher yields on M.IX than on M.II. Terminal growth was inhibited when branches were bent outwards, but there was no effect on the number of fruits harvested per branch. In scab control experiments, repeated applications of Tuzet inhibited growth and induced earlier autumn colouring of leaves than normal; fruit colour was best following Tuzet applications and poorest after zinc carbamate sprays; fruit yields were highest after zinc carbamate and lowest after wettable sulphur sprays.

121. C.S.I.R.O., Australia.
Fruit investigations.
A.R. C.S.I.R.O., 1957-58, 1958, pp. 28-9

Hobart. Naphthaleneacetic acid, kinetin and adenine all significantly increased cell number in apple fruits on the sprayed halves of trees, and there was some spread of the effect from the sprayed to the unsprayed half. A positive correlation was found between incidence of Jonathan spot and average fruit size per tree; Jonathan spot was increased by kinetin (significantly) and by adenine (not significantly), but was decreased by NAA treatment. Hand thinning of fruitlets in the cell division stage resulted in increased cell division, reduced maturation rate and reduced incidence of Jonathan spot. Wraps impregnated with 1·5 mg. diphenylamine still effectively controlled apple scald 18 months after preparation; diphenylamine could also be applied as a post-harvest spray. Preliminary results suggest that part of the higher susceptibility to disorders of light-crop fruit may be associated with higher internal carbon dioxide concentration in the fruit. *Applethorpe* (*Qd*). In rootstock investigations the heaviest yields from Granny Smith were obtained on M.II, and from Jonathan on M.XII; early results from a trial with Delicious show that Merton Sky and Merton 789 rootstocks both induce early growth and heavy bearing. A spray application of sugar and borax allowed earlier picking of Jonathan; early abscission of treated Granny Smith fruit, which had occurred in previous tests, was not observed.

122. Huang, P.-C.
Developing the cultivation of deciduous fruits in the mountainous area of Taiwan. [Chinese, with English summary 1 p.]
J. agric. Ass. China, 1959, **25**: 19-27.

More than 2,000 ha. over 1,000 m. above sea level could be used for deciduous fruit growing in Central Formosa. Apples, pears, chestnuts, walnuts, filberts, almonds and pecans are recommended.

123. Anstey, T. H., and others.
Relation of soil, temperature and topography to fruit growing in Summerland, British Columbia.
Canad. J. Plant Sci., 1959, **39**: 297-315, bibl. 38, illus.

With a view to preparing a map showing the factors that are limiting for the successful culture of the various kinds and varieties of tree fruits (apricot, cherry, peach, apple and pear), a survey was made of an area 7×4 miles and varying in elevation from 1,122 to 1,800 ft. above m.s.l. A car-mounted thermistor thermometer was found useful in establishing minimum temperature differences. Minimum temperature was shown to be the most important factor. It is concluded that a mean difference of as little as 4° F. in minimum temperature on clear calm nights can determine which kind of fruit can be grown satisfactorily at given locations. There appeared to be little relationship between soil class and kind of fruit that can be grown, except where the soil was non-arable or so poor that no fruit trees would grow satisfactorily. —Exp. Fms Serv., Canada Dep. Agric., Ottawa, and B.C. Dep. Agric., Victoria.

124. Sabirov, B. Z.
Specific composition and altitude limits of the distribution of wild fruit plants in Western Gissar. [Russian.]
Bot. Žurnal, 1959, **44**: 519-22, bibl. 11.

The distribution of 24 species of fruit trees and bushes at various altitudes in W. Gissar is compared with that in similar mountainous regions, including the Western Pamirs.

125. Kolesnikov, V. A.
Prospects of development in fruit growing. [Russian.]
Izv. Timiryazev. seljsk. Akad., 1959, No. 2, pp. 45-56.

A discussion of the present position and future improvement and expansion of top and small fruit growing in the U.S.S.R.

126. Dalrymple, D. G.
The Soviet fruit industry.
[*Mimeo. Publ.*] *Univ. Conn., Storrs*, 1959, pp. 11, bibl. 27.

Some economic aspects, especially the shortcomings of the marketing system, are discussed.

127. Lutz, R., Fritzsche, R., and Wirth, A.
Bewertung der Obstbäume. (**The evaluation of fruit trees.**)
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 456-63.

A simplified method of estimating the capital value of fruit trees at different ages and under different conditions.

128. Upshall, W. H.
The new orchard.
Bull. Ont. Dep. Agric. **528**, 1959, pp. 15, illus.

Suggestions on site, lay out, nursery stock and management, issued by the Horticultural Experiment Station, Vineland.

129. Harris, J. H., and Woods, J. J.
Dwarf apple trees on Vancouver Island.
Publ. exp. Fm, Saanichton, B.C., **171**, 1959, pp. 12, illus.

Recommendations for the culture of various tree forms on M.IX.

130. Thiele, G. F.
Dwarf apple trees.
N.Z. J. Agric., 1959, **99**: 127-33, illus.

Instructions for planting and maintaining apples on M.IX and MM.106 rootstocks, for the home gardener in New Zealand.

131. Plock, H.
Zur Entwicklung des Aprikosenanbaues im Mainzer Becken. (**On the development of apricot growing in the Mainz basin.**)
ErwObstb., 1959, **1**: 116-17, illus.

132. Hobbis, E. W., and Coles, J. S.
The destruction of apple tree stumps and roots by chemical means.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 56-61, bibl. 2.

A small scale trial is described in which the disintegration of apple tree stumps and roots by aqua regia, caustic soda, bleaching powder and a nitrogen-phosphate fertilizer [3 parts nitro-chalk : 1 part superphosphate, by weight] was investigated. Four years after treatment the fertilizer was the only material that had induced a softening of the wood. Caustic soda, commonly advocated as a softening-agent, was the least effective of the materials tried. [Authors' summary. See also *H.A.*, 27: 3340.]

Breeding and varieties.

(*See also* 119.)

133. Balsgård (Nybom, N., Bergendal, P. O., and Oldén, E. J.)
Föreningen för Växtförädling av Fruktträd. Verksamhetsåret 1958. (**Annual Report of Balsgård Fruit Breeding Institute for 1958.**) [English summary pp. 4], 1959, pp. 28.

Fruit variety and rootstock breeding. Apomixis in apples. Gamma irradiation of buds to induce mutations.

134. Gollmick, F.
Die Aufgaben der Grundlagenforschung bei der Züchtung krankheitsresistenter Obstsorten. **(Objects of fundamental research relating to the breeding of pest and disease resistant fruit varieties.)**
Reprinted from *Wiss. Z. Univ. Halle, Math.-Nat.*, 1958, **8**: 51-2.

135. Kessler, G. M. (Editor).
Fruit varieties for Michigan.
Ext. Folder Mich. St. Univ. **F-116**, revised 1958, pp. 15.

A guide to the selection of commercial varieties of tree and small fruits.

136. Sax, K.
The cytogenetics of facultative apomixis in *Malus* species.
J. Arnold Arbor., 1959, **40**: 289-97, bibl. 7, illus.

Facultatively apomictic species of *Malus* include *M. sikkimensis*, *M. rockii*, *M. hupehensis*, *M. toringoides*, *M. sargentii* and its variety *rosea*. All are polyploids and their breeding behaviour is reported. If such seedlings proved compatible with clonal varieties, they would provide uniform rootstocks without the need for vegetative propagation.

137. Naumov, V. A.
Vegetative segregation in hybrid apple seedlings. [Russian.]
Agrobiologija, 1958, No. 6, pp. 68-74, bibl. 4, illus.

Variability of fruit and leaf shape in Bergamot Reinette × Yellow Bellefleur.

138. Anon.
Introducing the Bledisloe N.Z. Cox.
Comm. Gr, 1959, No. 3332, p. 803, illus.

A brief report on a Cox sport, which may be picked 3 weeks earlier than Cox.

139. Brown, D. S., Hesse, C. O., and Koch, E. C.
Red sports of Delicious apple.
Calif. Agric., 1959, **13**(10): 3, 10, illus.

Observations on Delicious sports indicate that those of the striped type are more liable to revert than those with a normally uniform or solid red colour. The latter are to be preferred for districts where conditions for the development of a good red colour are not optimal. Care should be taken to select scion wood from non-reverted trees.—Univ. Calif., Davis.

140. Ritter, C. M., Hewetson, F. N., and Hitz, C. W.
Many bud sports of Delicious in apple variety trials.
Science for the Farmer, 1959, **6**(4): 14.

A list of bud sports of 9 apple varieties, including 26 sports of Delicious, tested at University Park, Pennsylvania, in 1959, with short descriptions of several of them.

141. McKenzie, D. W., and Mouat, H. M.
Freyberg—a new apple of quality.
Orchard. N.Z., 1959, **32**: 257.

A Golden Delicious × Cox's Orange Pippin seedling, recommended for home gardens.

142. North-Smith, G.
A survey of perry pears in the West Midlands: II. South-west Gloucestershire.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 67-9, bibl. 8, map.

Notes on synonyms and distribution. [For part I see *H.A.*, 25: 117.]

143. Williams, R. R., and North-Smith, G.
Perry pears and their characters: III.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 70-7, bibl. 2, illus.

Descriptions are given of the fruit, tree, flower and leaf of a further 13 perry pear varieties from Gloucestershire [for parts I and II, see *H.A.*, 25: 116 and 26: 141]. For each variety drawings are presented of typical fruits in longitudinal section, together with a flattened spur leaf. The winter appearance of mature trees is illustrated by photographs.

144. Morettini, A.
Una nuova pera. William precoce Morettini (William × Citron des Carmes 12/II). **(A new pear. Early Morettini Williams' (Williams' × Citron des Carmes 12/II).)**
Ital. agric., 1959, **96**: 747-55, illus.

This new pear variety is vigorous, even on quince rootstocks. Leafing and flowering are comparatively late, but the fruit ripens earlier than that of Williams'.

145. Ostapenko, V. I.
Some distant hybrids of stone fruits produced by academician P. N. Jakovlev. [Russian.]
Agrobiologija, 1959, No. 3, pp. 371-7.

Hybrids obtained by cross-pollinating apricot, peach and sand cherry (*Prunus besseyi*) with other species of Prunoideae are described. Distant hybridization was more successful when the activity of the oxidizing enzymes was higher in the male than in the female parent [see also *H.A.*, 27: 83], and the fruitfulness of the hybrids was usually proportional to the ease of crossing.

146. BAMBUKOV, P.
Pomological characteristics of apricot varieties in the Central and Eastern parts of Northern Bulgaria. [Bulgarian, with English and Russian summaries.]
Nauč. Trud. nauč.-izsled. Inst. Ovošč. Sofija, 1958, **1**: 65-102, bibl., illus., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk lesn. Hoz.*), 1959, **4**, Abstr. 97.

147. DICKSON, G. H.
Three new sweet cherry varieties from Canada.
Fruit Var. hort. Dig., 1959, **13**: 61.

Vista, Venus and Vic.

148. OBERLE, G. D., AND MOORE, R. C.
Redbud and Lexington, two new varieties of nectarine.
Fruit Var. hort. Dig., 1959, **13**: 50.

Good quality, early ripening.

149. HOUGH, L. F., AND WEAVER, G. M.
Irradiation as an aid in fruit variety improvement. I. Mutations in the peach.
J. Hered., 1959, **50**: 59-62, bibl. 13, illus.

Peach trees of 5 varieties were treated with Co^{60} gamma rays for 1- and 2-year periods. Mutations of potential value in variety improvement were produced on trees which had received 10–60 r per day of chronic radiation throughout the growing season. These mutations included changes in the season of ripening, in the flesh texture, in the freestone condition of the fruit, and in the pigmentation of the fruit and skin. A high-quality, firm, late-ripening sport of Elberta is the most promising of the new mutations.—Rutgers Univ., N.J., and Brookhaven nat. Lab., N.Y.

150. GRILLI, M.
La Luisa Berselli e la Desideria, due nuove cultivar di pesco. (**Two new peach varieties, Luisa Berselli and Desideria.**)
Progr. agric., 1959, **5**: 1038-43, illus.

The early variety Luisa Berselli, cultivated for 5 years, has shown no dropping of flower buds, and good resistance to aphids, frost, leaf curl [*Taphrina deformans*] and shot hole [*Clasterosporium carpophilum*]. The late variety Desideria arose as a bud sport from Hale and produces fruit which is not easily damaged by handling and transport.

151. MORETTINI, A.
La nuova cultivar di pesco Fertilia Morettini. (**The new peach variety Fertilia Morettini.**)
Frutticoltura, 1959, **21**: 541-4, illus., and *Riv. Ortoflorofruttic. ital.*, 1959, **43**: 289-97, illus.

A fairly late variety of parentage J. H. Hale × (Lord Napier × Mayflower).

152. HINRICHS, H. A.
The Goldenred peach.
Fruit Var. hort. Dig., 1959, **13**: 54.

Attractive, high quality fruit from vigorous, productive trees.

153. HARRISON, T. B.
Garnet Beauty—an early mutation of Redhaven peach.
Fruit Var. hort. Dig., 1959, **13**: 55-6, illus.

Ripens about 10 days ahead of Redhaven.

154. FARMER, A.
Dwarf peach trees.
N.Z. Gdnr, 1959, **15**: 363-7, illus.

History and development of genetic dwarfs which fruit when 10–15 inches high.

155. TOORENAAR, G.
Een pruimen-rassenproef. (**A plum variety trial.**)
Fruitteelt, 1959, **49**: 767-8, illus.

From a trial at Wilhelminadorp of 14 plum varieties on Common Mussel, 8 have been selected for quantity and quality of crop.

156. BALEV, M.
Studies on plums. I. Varieties in the Trojansk region. [Bulgarian, with English and Russian summaries.]
Nauč. Trud. nauč.-izsled. Inst. Ovošč. Sofija, 1958, **1**: 33-62, bibl., illus., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 96.

Descriptions of 81 varieties, which are propagated mainly by seed or root suckers.

157. VERESS, S., AND ILLYÉS, G.
Contribuţiumi la selecţia prunului Bistriţa. (**A contribution to the selection of the Bistriţa plum.**) [English, Russian and Hungarian summaries ¾ p. each.]
Lucr. şti. Inst. agron. "Dr. Petru Groza" Cluj, 1958, **14**: 204-16, bibl. 6.

Local Roumanian selections for disease resistance and frost hardiness.

Propagation and rootstocks.

(*See also* 73, 121, 129, 130, 202, 213, 335, 417, 1091, 1449.)

158. SCHÜLE, H.
Ankörung von Obstmutterbäumen in Baden-Württemberg. (**The selection of fruit mother trees in Baden-Württemberg.**)
ErwObstb., 1959, **1**: 99-101.

Describes the selection of mother trees by Government agencies for the production of seed, scions and rootstock clones.

159. Stoičkov, J.
The relationship between the development of certain apple rootstocks and that of the scion varieties worked on them. [Bulgarian, with English and Russian summaries.]
Nauč. Trud. Visš selskostop. Inst. "Georgi Dimitrov", Agron. Fak. 1958, **5**: 83-101, bibl., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 68.

Observations were made over the period 1936–1953 on the slow-growing apple variety Zolotaja Prevoshodnaja and the vigorous variety Karastojanka, both grown on seedlings of 3 forms of *Malus sylvestris* differing in root structure. While the main root characteristics were not affected by the scion variety, there was a marked effect of scion on the number of roots, time of root development and regeneration of skeletal roots. The relationship between the aerial development and the root development can be expressed by the ratio weight of stem : weight of roots, and this ratio was found to be greatest in trees in which the aerial system developed rapidly, growth ceased early and bearing commenced early.

160. Ritter, C. M., and Tukey, L. D.
Growth and fruiting of various apple varieties in response to several clonal rootstocks.
Bull. Pa agric. Exp. Stat. **649**, 1959, pp. 21, bibl. 20, illus.

During the first 15 to 20 years of growth, apple trees of 75 variety-rootstock combinations showed marked differences in tree shape and in crotch angles. Trees on M.I, II, XV and G.6 [from Long Ashton] generally had wide crotch angles; scion varieties which tended to produce wide crotch angles were Canada Red, Delicious, Ohio Nonpareil, Cox Red Rome and Stayman. Trees on M.II, G.6 and G.7 were smaller than those on M.X, XII, XIII, XV and G.8. Canada Red and Cox Red Rome made the smallest, most compact trees, while Stayman and Ohio Nonpareil made the largest trees. Excessive scion overgrowth at the union was observed in all combinations with M.II, while G.6 and G.7 were generally associated with stock overgrowth. Both extremes are probably types of partial incompatibility. Considerable root suckering of M.II in combination with Cortland, Lobo, Macoun, Melba, Northern Spy and Stayman was observed. Varieties on M.II came into production from 2 to 5 years earlier than the same varieties on other stocks. Determinations of "production efficiency", based on the orchard space required to produce 1 bushel of apples and on bushel yield per inch of scion circumference, were not conclusive.

161. Hilkenbäumer, F.
Unterlageneinfluss bei Apfelsorten. **(Rootstock influence on apple varieties.)**
ErwObstb., 1959, **1**: 147-51, bibl. 4, illus.

Up to the age of 5 years rootstock influence on apple spindle bushes was largely masked by tying down the shoots not needed for framework formation. With M.XI, seedling and A.2 rootstocks the operation reduced the vigour of the trees to that of trees on medium-vigorous rootstocks. The change was accompanied by earlier bearing and by increases in yield. M.IX and M.VII had the most favourable influence on fruit size. M.IX induced the best fruit colour, followed by M.IV, while fruits on seedling and A.2 rootstocks showed the least colour. The modification of the rootstock effect by double-working is to be discussed in another paper.—Inst. Obstb., Univ. Bonn.

162. Uitterlinden, L., and Slotboom, H. J.
De onderstammen IV en VII. **(The rootstocks M.IV and VII.)**
Fruitteelt, 1959, **49**: 808-10, illus.

Trees of Winter Banana, Lombarts Calville and Golden Delicious were smaller on M.VII than on M.IV. Yields of Winter Banana and Lombarts Calville were higher on M.IV than on M.VII, but when related to tree size there was little difference between yields. Fruit from M.IX was of a better colour than that from M.IV or VII, and fruit size was greater on M.VII and IX than on IV. There was little difference in the occurrence of storage rots of fruits from different stocks; but fruit from trees on M.VII stored better than that from trees on M.IV or M.IX.—R.T.C., Barendrecht.

163. Fritzsche, R.
Hat sich die Veredlungs-Unterlage E.M. Typ XIII bei uns bis heute bewährt? **(Has the rootstock M.XIII proved its value in Switzerland?)**
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 480-3, illus.

Twenty-two years of observations in several localities have shown that M.XIII is an excellent rootstock for half-standard apple trees. It has been tested successfully in combination with a number of varieties.

164. Ali, N., and Ali, S.
First progress report of the scheme on "Propagation of hill and other deciduous fruits in Murree Hills, Soon Valley, etc.".
Punjab Fruit J., 1958/1959, **22**(78): 30-9.

Including the use of local pear and apple varieties as rootstocks.

165. Chaudun, V.
L'*Eriolobus indica* Rehder, est-il le porte-greffe commun possible de nos espèces fruitières à pépins? **(Is *Eriolobus indica* a possible general rootstock for pome-fruit trees?)**
Ann. Soc. nat. Hort. France, 1959, **5**: 502-3, bibl. 1, illus.

he characteristics of this native species of Burma, iêt-nam and northern India are described. Its hromosome number (2n = 34) and its frost esistance are the main features suggesting its uitability as a rootstock for apple, pear and quince rees.

166. Scaramuzzi, F.
Osservazioni comparative su differenti combinazioni d'innesto fra pero "Kaiser" e cotogno. **(Comparative observations on different graft combinations of Kaiser pear and quince.)** [English summary 8 lines.]
Riv. Ortoflorofruttic. ital., 1959, **43**: 222-32, bibl. 16, illus.

All possible graft combinations of Kaiser, Beurré Iardy and quince were made and then grafted on ither quince or seedling pear. The results are liscussed in relation to plant development, starch listribution and structure of the union. [For earlier vork see *H.A.*, 28: 102.]

167. Dickson, G. H.
Pear rootstock trials.
Bienn. Rep. hort. Exp. Stat. Prod. Lab., Vineland, for 1957 and 1958, pp. 28-34, bibl. 6.

In a comparative test of seedling rootstocks of Bartlett and Kieffer for 5 pear varieties the growth and yield of all varieties were better on Bartlett seedlings than on Kieffer seedlings. Three varieties on *Pyrus betulaefolia* have made good growth and yielded well, but the rootstock cannot be recommended because of its tendency to induce black-end. East Malling pear rootstock selections are not recommended owing to the difficulty of propagation and the differences in varietal response. A vegetatively propagated rootstock selected at Vineland and designated V.I has proved an unsatisfactory rootstock for Bartlett and is of doubtful value for Kieffer.

168. Andreeva, I. S.
The ability of pears to root from softwood cuttings. [Russian.]
Agrobiologija, 1959, No. 1, pp. 146-7, illus.

Softwood cuttings of 12 species, varieties and hybrids of pear were compared. The best rooting was shown by *Pyrus betulaefolia*, although its anatomical structure did not differ from that of the others. In another trial with 4 varieties, cuttings from 2-year-old seedlings gave 12–53% rooting and those from mature trees 0–8%.

169. Odarič, T. P., and Il'čenko, M. F.
A trial on pear propagation from cuttings. [Ukrainian, with Russian summary.]
Nauk. zap. Kijivs'k Un-t, 1957, **16**(1): 105-9, from *Ref. Ž.* (*Biol.*), 1958, No. 12, Abstr. 53,809.

Immersion of the basal end of softwood cuttings of *Pyrus communis* in 0·015 or 0·02% β-indolylacetic acid for 24 hours resulted in 36% rooting. When a supplementary spray of the same compound was applied to the planted cuttings, rooting was increased to 52%. Treatment of cuttings with 0·01% phenylacetic acid resulted in a 32% strike.

170. Ven'jaminov, A. N., and Jusubov, A. M.
The effect of the preparation of apricot seed on seedling development. [Russian.]
Agrobiologija, 1959, No. 1, pp. 148-50, illus.

When apricot seeds, stratified for 45–55 days at 4–5° C. in moss, were subsequently held at —1° to —2° C. for about 2 months, they showed better field emergence and more vigorous seedling growth during the first 2 years than those not given the supplementary cold treatment after stratification.

171. Pollock, B. M., and Olney, H. O.
Studies of the rest period. I. Growth, translocation, and respiratory changes in the embryonic organs of the after-ripening cherry seed.
Plant Physiol., 1959, **34**: 131-42, bibl. 20, illus.

In seeds after-ripened at 5° C. the capacity for growth develops linearly with time after a lag of 4 weeks. This capacity for growth is paralleled in the embryonic axis by an increase in dry weight, indicating translocation of material from the cotyledons, but is preceded by cell divisions and a sharp increase in respiration rate. Using 2,4-dinitrophenol to obtain a measure of respiratory capacity, we find that the increase in respiration is paralleled by an increase in respiratory capacity. By contrast, in seeds after-ripened at 25° C. growth capacity does not develop, and little translocation to the potentially growing cells of the embryo is evident. The respiratory rate remains approximately constant, but the respiratory capacity rises, accompanied by a significant number of cell divisions, within the first 4 weeks of after-ripening, but thereafter it declines to its original level. [From authors' summary.]—Univ. Delaware, Newark.

172. Capucci, C.
Fattori che possono influire sullo sviluppo e sulla produzione del ciliegio. **(Factors affecting the growth and yield of cherry trees.)** [English, French and German summaries, 13 lines each.]
Frutticoltura, 1959, **21**: 369-79, bibl. 8, illus.

On *Prunus mahaleb* rootstocks the growth of Moretta di Cesana cherry was more vigorous for at least 10 years, and higher yields of larger and earlier fruit were produced for 14 years, than on seedling rootstocks. By the 22nd year, however, the trees on mahaleb were smaller and lower yielding than those on seedling rootstocks, and some were showing symptoms of degeneration, but those remaining healthy were still producing larger and earlier fruit. Trunk girth and crown size were greater in bush than in standard trees.—Ist. Colt. arb., Univ. Bologna.

173. Bruhlej, M. A.
The effect of the duration of seed vernalization and of light conditions on the frost resistance of peach seedlings. [Ukrainian, with Russian and English summaries.]
Dopovid AN URSR, 1957, No. 4, pp. 402-5, from *Ref. Ž.* (*Biol.*), 1958, No. 13, Abstr. 58,749.

In the Ukraine increased frost resistance was shown by peach seedlings which were grown from seed vernalized for 90 days and were given reduced photoperiods at the end of the growing season (August).

174. Rudkovskij, G. P.
Prunus tomentosa, **a good rootstock for peach.** [Russian.]
Sadov. Vinograd. i. Vinodelie Moldavii, 1957, No. 3, pp. 22-3, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 49,114.

Peaches entered into bearing earlier and produced larger fruits on *P. tomentosa* than on 11 other rootstocks.

175. Upshall, W. H.
Plum rootstock trials.
Bienn. Rep. hort. Exp. Stat. Prod. Lab., Vineland, for 1957 and 1958, pp. 35-8.

Shiro, Burbank, Stanley and Italian Prune have produced higher yields in the first 9 years on peach seedling rootstocks than on myrobalan. Grand Duke was not compatible with peach. Preliminary results show that St. Julien A is a satisfactory stock for Shiro, and Michaelmas Prune is satisfactory for Italian Prune; both varieties have done well on Ackermann's Marunke.

176. Sokolov, A. K.
Rooting of fig cuttings in relation to their quality and time of taking. [Russian.]
Agrobiologija, 1958, No. 6, pp. 127-9.

Confirmatory results of work reported in *H.A.*, 28: 2171.

177. Heyman, J.
Stekken van moerbei. (**Cuttings of mulberry.**)
Cult. Hand., 1959, **25**: 282-3, illus.

Tip cuttings of mulberry taken on March 21 and dipped in a powder containing 0·2% NAA did not root under double glass. Other work on mulberry propagation by cuttings is briefly discussed.

Climatic factors.

(*See also* 11, 14, 157, 173, 226, 236.)

178. Sarasola, A. A.
Efectos del sol y de las heladas de invierno en los frutales y forestales. (**Effects of sun and winter frosts on orchard and forest trees.**)
Idia, 1959, No. 139, pp. 17-25, bibl. 12, illus.

Injuries from winter frost, alone or combined with sudden hot days, are described for trees in Argentina, including peach, plum, apple, *Acer negundo*, *Tilia platyphyllos*, *Populus nigra*, willow, *Eucalyptus* spp., *Acacia* spp. and *Ligustrum* spp. If apple trees develop collar rot as a result of such conditions, they can sometimes be cured by exposing the affected parts, treating them with a mixture of copper sulphate and lime, and not replacing the excavated soil until new roots develop.

179. Wilner, J.
Note on an electrolytic procedure for differentiating between frost injury of roots and shoots in woody plants.
Canad. J. Plant Sci., 1959, **39**: 512-13, bibl. 3, illus.

One-year-old apple trees in pots were exposed to low temperatures. Electrolytic tests on water extracts from roots and shoots showed that the diffusion of electrolytes from injured roots was 2 to 3 times as great as that from uninjured roots taken from control plants. As the diffusion rates from the shoots were within a range not associated with twig injury when the roots were protected from freezing, it was deduced that growth failure in the experiment was entirely due to root injury. [See also *H.A.*, 28: 3303.]

180. Karnatz, A.
Über Verschärfung von Frostschäden. (**On the intensification of frost injuries.**)
ErwObstb., 1959, **1**: 153, bibl. 1.

Flower buds of several apple varieties enclosed in cloth bags (16 × 25 cm.) shortly before bud burst suffered much more severely from spring frost injury than exposed buds. The damage occurred, strangely enough, not low down but high up in the tree. For an explanation of the phenomenon of supercooling observed inside the bags, reference is made to a recently published paper: Rohmeder, E., and Eisenhut, G., Untersuchungen über das Mikroklima in Bestäubungsschutzhüllen. (Studies on the microclimate in pollination bags.) *Silvae Genet.*, 1959, 8: 1-36.—Inst. Obstb. tech. Univ. Berlin.

181. Karnatz, A.
Blütenfrost an Apfelspindeln in offenem und gemulchtem Boden. (**Frost damage to blossoms on apple spindle bushes in cultivated and mulched soil.**)
ErwObstb., 1959, **1**: 115-16.

In the late frost years of 1957 and 1959 injuries to the carpels and stamens of apple spindle bushes amounted to about 40% and 70% on cultivated soil and on soil mulched with leaves, respectively. The insulating effect of the layer of leaves, preventing the escape of heat from the soil during the night, was reflected in temperature measurements at various levels above the ground. Immature pollen grains, in contrast to mature pollen, proved to be particularly susceptible to frost.—Inst. Obstb. tech. Univ. Berlin.

182. Metlickij, Z. A., Suhoivanenko, N. G., and Il'juščenko, K. L.
Results of pruning frost damaged apple trees. [Russian.]
Sad i Ogorod, 1959, No. 5, pp. 41-4, illus.

Pruning in the spring immediately following frost injury is recommended.

183. Gilbert, F. A.
Winter injury to sweet cherry blossoms.
Fruit Var. hort. Dig., 1959, **13**: 52.

During December, January and February there were 34 days when the minimum temperature was below zero. Examination of lateral and spur blossom buds of 10 varieties of sweet cherry, planted 6 years previously and grown under a clean cultivation/cover crop system, showed that Bing and Windsor had the highest percentage of live blossoms and Schmidt and Yellow Glass the lowest. The percentage of blossoms killed in the lateral buds on the new wood was greater than that in the spur buds.—Peninsula Branch Exp. Stat., Door County, Wisconsin.

184. Crawford, T. V., and Brooks, F. A.
Frost protection in peaches.
Calif. Agric., 1959, **13**(8): 3-6, illus.

A ground-level wind machine (revolving through 360° in 5½ min.) was tested during 2 nights in a flowering peach orchard. On March 20 a temperature rise of 1° F. was produced over 2·7 acres at 6 ft. above ground level, and over 2·2 acres at 15 ft. On March 25 the corresponding acreages covered were 3·8 and 6·1. When 2 burners attached to the wind machine were lit, protection was improved at the 6 ft. level, but was less at the 15 ft. level, owing to the increased rate of heat dissipation out of the orchard. It is suggested that this ground level fan would distribute hot air more efficiently from scattered orchard heaters.—Univ. Calif, Davis.

185. (Dahlmans, H. W.)
Nachtvorstbestrijding door stoken van turf. **(Frost protection by burning turf.)**
Fruitteelt, 1959, **49**: 829, 833, illus.

Drums of 70–100 l. capacity had holes pierced 10–15 cm. above ground level and were filled with a layer of straw and a layer of turf. When placed at the rate of 200–250 per hectare in a peach orchard, heat from the burning turf protected fruitlets on 3 nights in which temperatures dropped to −5° C.—R.T.C., Maastricht.

186. Dimitrovski, T.
Problem sušenja kajsija u N.R. Makedoniji. **(The problem of withering of apricot trees in Macedonia.)** [English summary ¾ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 241-6, bibl. 7.

The primary cause of this withering, observed in the Skopje district in 1954–57, was found to be freezing, secondary causes being fungi and insects attacking the weakened trees.—Inst. Fruit Growing, Skopje.

187. Hamer, P. S.
For growers it's "remember the fifth of September".
Grower, 1959, **52**: 184-6, illus.

A preliminary survey of damage caused in apple orchards by last year's hail storm in West Sussex has shown that Cox wood was most susceptible, Bramley wood was intermediate and Worcester least susceptible. Orchards which were sprayed with captan within 10 days of the storm showed less cankering and die-back of extension shoots than those in which there was a delay of more than 3 weeks in spraying.—Kirdford Growers.

188. Schaltegger, K.
Ozonschäden an Obstbäumen. **(Ozone injury to fruit trees.)**
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 447-8, illus.

Atmospheric ozone from factory wastes caused tip and marginal leaf scorch on prune and cherry plum leaves. Typical symptoms were induced artificially in laboratory tests.—Eidg. Versuchsanst., Wädenswil.

Soil management and irrigation.

(*See also* 181, 198, 213, 287, 417, 544, 938.)

189. Miggireva, O. F.
Orchard soil management under conditions of a hot and arid climate. [Russian.]
Sad i Ogorod, 1959, No. 5, pp. 56-9, illus.

In Turkmenia, where moisture is the limiting factor to fruit production, clean cultivation plus irrigation, and green manuring, grassing down and hay mulching all proved either unsuitable or impracticable. A permanent natural sod mulch of ephemerals, however, greatly improved the physical and chemical condition of the soil, the growth of the trees and the yield and quality of the fruits. It mitigated extremes of soil temperature, and on one summer day reduced the temperature of the soil surface from the exceptional level of 70·5° to 39·5° C. The mulch was initiated in the autumn of 1949 by broadcasting seed of local wild ephemeral grasses and legumes in the inter-rows of plum, apple and pear orchards. The plants reached a height of 110–140 cm. by the end of April, when they were rolled to form a mulch and were thereafter self-regenerating. The accumulated plant material has so far been left undisturbed, but ploughing in every 10–15 years is suggested. Irrigation and the application of fertilizers were unhindered by the mulch, and plant protective chemicals were applied to the ground cover as well as to the trees.

190. Rubcov, V. V.
The reaction of active roots of apple to methods of orchard management. [Russian.]
Dokl. vsesojuz. Akad. seljsk. Nauk, 1959, **24**(5): 30-3.

The roots of the apple tree above a depth of 40–50 cm. showed a double peaked growth curve, maxima occurring in late spring and early autumn. Below 50 cm. growth was fairly uniform. In the upper zone the total length of active white rootlets per cm. of conducting root was measured under different soil managements. It was 7·5 mm. under clean cultivation, but ranged from 3·88 mm. under a complete cover of permanent grasses to 6·78 mm. under a mixture, in which legumes predominated, sown in the inter-rows only. On ploughing up the following year, the relative length of the rootlets increased to 8·18–11·63 mm., while under permanent clean cultivation it fell to 5·11 mm. The sod cover reduced the annual top growth increments and yields by 24 and 25·6%, respectively, compared with clean cultivation, but after ploughing there were increases of 28·3 and 34·7%, respectively, over the controls.

191. Butijn, J.
Het bodemkundig onderzoek. **(Soil studies.)** [English summary ¾ p.]
Jversl. Proefst. Fruit. Wilhelminadorp, 1958, pp. 27-36, illus.

Water relations. Sprinkler irrigation of 2-year-old strawberries had a detrimental effect on yield. Irrigation of raspberries gave good results, and there was a 25% higher yield in the first year from irrigated plants than from non-irrigated plants; raspberry yields were increased by 20–30% by irrigating before, and particularly during, harvesting. *Soil management.* A permanent grass cover, even when kept very short, is considered to be too competitive for apple trees, and a winter cover of ryegrass is recommended. Another method suggested is rotary cultivation in the rows with a permanent grass strip between the rows. Pears responded to sprinkler irrigation by a 20–50% increase in yield. *Mineral nutrition.* Leaf fall of young Cox trees was related to Mg deficiency in relation to K. Iron chelate application for the correction of Fe chlorosis was successful only in loess soils.

192. Johansson, E.
Jordfuktighet i fruktodlingsförsök vid Alnarp 1954-1958. **(Soil moisture measurements in fruit trials at Alnarp in 1954-1958.)** [English and Esperanto summaries 1¼ pp. each.]
Medd. Trädgårdsförs. Alnarp **125**, 1959, pp. 29, bibl. 14, illus.

Soil moisture measurements by electrical resistances showed that soil dried out first in the summer under a grass sward, then under a cover crop and last under clean cultivation. Under a straw mulch soil moisture at a depth of 25 cm. was near to field capacity throughout the summer. There were no indications from a manurial trial that a higher K supply increased the moisture-holding capacity of the soil. Two apple varieties, Filippa and Husmoder, gave higher yields under mulch than in grass or clean cultivation. Yields of Cox were about equal in clean cultivated soil and grass, but were higher in cover cropped plots.

193. Fahmy, I., and Hurt, B. C., Jr.
Peach orchard culture studied.
Miss. Fm Res., 1959, **22**(3): 6, illus.

The methods of soil management studied were: (A) winter cover crop of crimson clover, mowed in summer and mulched; (B) as A but clean cultivated in summer; (C) summer crop of lespedeza, mowed and mulched, no winter treatment; (D) as C but no mulching. All 4 varieties tested gave markedly better yields and growth with the two clover treatments. Dixired and Redhaven also responded appreciably to the clean cultivation in summer, whereas Triogem and Sullivan's Early Elberta did not.

194. de Silva, A. S. P.
A cobertura do solo em pomar de pessegueiro. **(Soil cover in a peach orchard.)**
Diár. pop., 7 Oct. 1956, revised as *Comun. Inst. agron. Sul. Pelotas* **13**, 1957, pp. 3, [received 1959].

In a 4-year trial a 15-cm. straw mulch gave the best growth and yield of Leader peaches, followed in descending order of efficacy by a winter leguminous cover crop, clean weeding, a summer leguminous cover crop and a permanent grass cover. The mulch conserved soil moisture, prevented erosion, reduced the seasonal variation in temperature, increased humus considerably, increased the thickness of the arable layer, eliminated weeds completely and was cheap.

Nutrition and tree composition.

(*See also* 119, 191, 225, 226, 281, 282, 335, 449, 1149.)

195. Ljones, B., and Semb, G.
Naeringstilstanden i norske frukthagar, vurdert på grunnlag av jordanalyser. **(The nutritional status of Norwegian orchards evaluated on the basis of soil analyses.)**
Frukt og Baer, 1958, **11**: 32-6.

196. Foster, W. R., and Moisey, J. A.
Mineral deficiencies and other disorders of fruit-trees.
Plant Path. Circ. B.C. Dep. Agric. **1**, 1959, pp. 12, illus.

Notes are given on the symptoms and control of B, Fe, Mg, Mn and Zn deficiencies in pome and stone fruits; of bitter-pit and water-core in apple; and of d'Anjou pit and black-end in pear.

197. Gayford, G. W.
Zinc deficiency in deciduous trees.
J. Agric. Vict., 1959, **57**: 380, illus.

Apple trees should be sprayed in winter with 25 lb. zinc sulphate per 100 gal. water, increased to 50 lb. in severe cases. Peaches and apricots should be given a foliar spray containing 5 lb. zinc sulphate and 2 lb. slaked lime per 100 gal. in November.

198. Tiller, L. W., Roberts, H. S., and Bollard, E. G.
The Appleby experiments. A series of fertilizer and cool-storage trials with apples in the Nelson district, New Zealand.
Bull. N.Z. Dep. sci. industr. Res. **129**, 1959, pp. 155, bibl. 4, illus.

The effects of N and of NPK on fruit yield and tree girth were studied for 24 years with Sturmer Pippin, Delicious, Dunn's Favourite and Jonathan, and for 16 years with Cox's Orange Pippin. Additional treatments were: P and NP for Sturmer, PK for Cox's and NP for Jonathan. Yield increases due to N ranged from 25% with Delicious to 63% with Cox's. Further increases obtained by adding PK to N ranged from 10% with Cox's to 35% with Sturmer. Overall response to NPK was lowest with Dunn's (47%) and highest with Sturmer (81%). Responses of yield and tree girth to P or PK were low. Fertilizer treatment had little or no effect on biennial bearing. Fruit size was significantly increased by NPK in Sturmer, Delicious and Cox's, and fruit colour in Jonathan was more intense with NPK than with NP. In a further long-term series of experiments yields of Jonathan were not significantly different when N was applied in autumn or in early or mid spring, but placement of N in a 3 ft. wide circular band with its inner margin 4½ ft. from the trunk gave higher yields than spreading the same amount (2 lb. of ammonium sulphate) over a 3-ft. radius round the trunk, which in turn was more effective than using a 6-ft. radius. The yield response of Dunn's and Jonathan to N was substantially greater with 4 than with 2 lb. of ammonium sulphate per tree, and fruit colour in Jonathan decreased with increasing N, when P and K were supplied at constant normal rates. The average yields of Cox's were slightly but not significantly higher, and fluctuation in alternate years tended to be greater, with dried blood than with ammonium sulphate as the N source. Liming in alternate years at 2½ tons per acre significantly increased yields of Dunn's Favourite, the effect being partially attributable to the improved growth of the clover cover crop. Correlations are tabulated for all 5 varieties between blossom production, tree height, spread and girth, number of fruits, and yield. Fruit colour is included for Jonathan. The application of N reduced the storage quality of Sturmer, Cox's and Jonathan, increasing the incidence of internal breakdown in particular, and of fungal rots and superficial scald. The addition of P or PK to the N improved storage quality, but, in general, the unmanured trees of these 3 varieties produced the best fruit for storage. With Jonathan NPK gave better storage results than NP. Correlations are tabulated between percentages of sound, commercially sound, and variously diseased and disordered stored fruit of each variety.

199. Lamb, J. G. D., Golden, J. D., and Power, M.
Chemical composition of the shoot leaves of the apple Laxton's Superb, as affected by biennial bearing.
J. hort. Sci., 1959, **34**: 193-8, bibl. 6.

For 4 years samples of mid-shoot leaves were taken from bearing and non-bearing trees of Laxton's Superb apple, and their chemical constitution was determined on a dry weight basis. It was found that, corresponding to the biennial-bearing habit of the trees, the chemical composition of the foliage at the sampling date (September–October) showed a biennial fluctuation. The cropping trees were found to have higher percentages of N and Ca in the mid-shoot leaves, with a tendency to higher Mg also. The K and P levels were lower. There was evidence that changes in leaf composition due to increased N nutrition were similar to those due to cropping, and that the combination of increased N with cropping intensified these changes. [Authors' summary.]—Johnstown Castle agric Coll., Wexford, and Dep. Agric., Ireland.

200. Garman, P., and Mathis, W. T.
Studies of mineral balance as related to occurrence of Baldwin spot in Connecticut.
Bull. Conn. agric. Exp. Stat. **601**, 1956, pp. 19, bibl. 35, [omitted in error from *H.A.*, Vol. 27].

In tissues with Baldwin spot the Mg/Ca ratio was abnormally high; the ratio K+Mg+P/Ca was also of significance, and it is suggested that Ca is the critical element. Analyses showed that fruit contents of Ca in mid-August were low in comparison with leaf contents, and that Ca declined rapidly until harvest; only Fe declined at a greater rate over the same period. In a study of differences between varieties, and even between individual trees, analyses showed that high K+Mg/Ca ratios are related to increased prevalence of Baldwin spot. Fruit Ca contents declined more rapidly, owing to foliage demands, in light-crop than in heavy-crop trees, but Mg declined faster in heavy-crop trees. High fertilizer levels of N depressed P and tended to depress Ca in Baldwin fruits. High levels of K appeared to depress B, but high or low P levels had no effect. Calyx injections or branch dips of potassium nitrate and/or magnesium sulphate increased the symptoms of Baldwin spot. Several trials have indicated that foliar sprays or soil injections of calcium nitrate or phosphate will reduce Baldwin spot.

201. Gruppe, W.
Versuche mit Harnstoffspritzungen an Apfelbäumen. **(Experiments on the spraying of apples with urea.)**
Gartenbauwiss., 1958, **23**: 494-506, bibl. 28.

The results of 4 experiments confirmed the findings of other workers, viz., that repeated applications of urea may have a favourable effect on the vegetative growth and the yield of apple trees. The N supply to the experimental trees had been low to medium. Maiden trees grown in containers, including such susceptible varieties as Cox's Orange, Laxton and Golden Delicious, tolerated 6 applications of urea at 1%. Sprays of 2% urea caused major leaf damage, though the increase in growth was greater. Applications of 0·5% urea had a favourable effect on leaf growth. In another container trial 6 urea sprays at 1%, given in conjunction with medium soil applications of N, had a much more beneficial influence on vegetative growth than a similar amount of N applied entirely to the soil. In a field trial, carried out for 5 years on 3–7-year-old trees receiving a medium supply of N, 4 urea sprays at 0·7% increased yields by 13·5% during the first 4 years. In the case of slow growing varieties this increase was due to a larger number of fruits per tree. Vigorous varieties, which came into bearing later, showed a significant increase only in vegetative growth. It is concluded that, on the whole, foliar nutrition with urea must be regarded as an emergency measure to be used, for instance, under conditions of drought.—Inst. Obstb., Hannover.

202. Greenham, D. W. P., and White, G. C.
The control of magnesium deficiency in dwarf pyramid apples.
J. hort. Sci., 1959, **34**: 238-47, bibl. 17.

Magnesium-deficient dwarf pyramid apple trees of the variety Edward VII on M.VII rootstock were used in an experiment to test the efficacy of Epsom salt and urea sprays for the control of this disorder. In each of the 5 years, 5 post-blossom applications of 2% Epsom salt sprays effectively increased the leaf Mg content, delayed the onset of leaf symptoms and markedly reduced their subsequent severity. Although little evidence was obtained of a growth response and the number of fruit buds was not increased, the cropping was considerably improved. A suggestion is made that the increased number of fruits was related to the control of early-season deficiency symptoms of fruiting spurs. Low volume applications of concentrated Epsom salt sprays, tested on a limited scale, were found to be practicable but appeared to be less effective than the usual sprays. Sprays of 0·5% urea, though they did not raise the leaf Mg status or control the foliar deficiency symptoms, increased the cropping, possibly because of a direct N effect on fruit setting or of a Mg mobilization role. [Authors' summary.]—E. Malling Res. Stat., Kent.

203. Allen, M.
Role of the anion in magnesium uptake from foliar application of its salts on apple.
Nature, 1959, **184**: 995, bibl. 1.

The results of experiments in which apple leaves were momentarily dipped into *M*/10 solutions of 3 magnesium salts conformed with previous experience, which showed that Mg is taken up quickly from the chloride and nitrate salts, but more slowly from the sulphate. When leaves were left immersed, however, the rate of uptake was independent of the anion. It is suggested that the deliquescent nature of the chloride and nitrate, in contrast to the sulphate, may account for the different rates of uptake by dipped leaves.—E. Malling Res. Stat., Kent.

204. Zeiders, K. E., and Fink, H. C.
Studies on internal bark necrosis of Red Delicious apples.
From abstr. in *Phytopathology*, 1959, **49**: 526.

Symptoms of internal bark necrosis caused by Mn toxicity and B deficiency are described. They were not caused by excess Fe nor by high soil chlorides.

205. Fernández, C. E.
Molybdenum studies with apple and tomato in New Jersey.
Diss. Abstr., 1959, **20**: 16-17, being *L.C. Card No. Mic.* 59-1815 of 46 pp.

Symptoms of artificially-induced Mo deficiency in apple seedlings are described. In deficient leaves Mo levels were 0·05 p.p.m. (compared with 0·16 p.p.m. in healthy leaves), and there were accumulations of nitrates. A bio-assay technique for Mo using *Aspergillus niger* as a test organism is described, which allows the determination of very small amounts of Mo. Leaf analysis studies using this technique showed July to be the best sampling month for studying Mo nutrition. In July the leaf content of Mo was positively correlated with soil pH and negatively correlated with soil and leaf Mn. In nutrient solution studies with tomatoes a low level of Mo (0·0001 p.p.m.) did not affect growth or vitamin C content of the juice, although the tissue contents of Mo in the treated plants approached those of plants not receiving Mo. Without Mo, plants showed typical deficiency symptoms and did not set fruit.—Rutgers Univ., N.J.

206. Ystaas, J.
Bormangel hjå paere, ei mogleg årsak til misvekst og dårleg fruktsetjing. **(Boron deficiency in pears, a possible cause of stunting and poor fruit set.)**
Frukt og Baer, 1958, **11**: 26-31, bibl. 14, illus.

Young pear trees showing stunting and poor fruit development resumed normal growth habits after a single application of borax in April (150 g. or 300 g. per tree). The leaf content of B was increased by the soil application. Spraying with a 0·15% borax solution plus spreader twice in June gave less striking results. An annual soil application of 1–2 kg. borax per 100 sq. m. is recommended as a routine measure for pears, with foliar B nutrition held in reserve for critical situations.

207. Kemp, W. S.
Zinc deficiency of Newcastle apricots.
Orchard. N.Z., 1959, **32**: 219-21, bibl. 3, illus.

Apricots growing on a light sandy soil, with pH 8·2, showed leaf chlorosis and abnormal growth, which was corrected by a foliar spray of zinc sulphate plus hydrated lime. A formula of 6 : 8 : 100 is recommended for applications either in late spring or early autumn. Cropping ability is also affected by Zn deficiency.

208. Malyčenko, V. V.
The regeneration of injured cherry roots in relation to conditions of mineral nutrition. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(6): 19-24, illus.

The variety used was the sour cherry Ljubskaja on mahaleb planted in 1944. In 1952 and 1953 roots 6–7 mm. in diameter were severed at 0·5–1·0 m. from their point of origin and the cut ends were inserted in glass jars filled with a 1 : 1 mixture of soil and sand to which various combinations of NPK were added. When cut in early spring root regeneration was most rapid with P and PK treatments, but after harvest root development with these treatments declined, and by the end of the growing season the greatest mass of new roots was found in the jars containing N. The reaction of the roots to injury and manuring at different dates during the growing season varied. It is concluded that where the roots of fruit trees have been injured by transplanting or cultivation, P and K should be applied to the rhizosphere in early spring and N just before the cessation of vegetative growth at the time of maximum foliation.

209. Reckendorfer, P.
Die Kalkchlorose in ihren Beziehungen zum Eisen. Das Coenzym. II. Teil: Modellversuch im Obstbau. Vorläufige Mitteilung. **(Lime-induced chlorosis in relation to iron. The coenzyme. II. Pilot trial in the orchard. Preliminary report.)** [English summary 11 lines.]
PflSch. Ber. Wien, 1959, **22**: 137-43, bibl. 9.

From one season's experiments with cherry trees, the leaves of which had lost their green colour, it is concluded that lime-induced chlorosis may be interpreted as a disturbance of the physiological balance of the cell. Such disturbance occurs when the formation of the specific co-factor built into the Fe-chelate structure is prevented because of the absence of the organic chelate promoter (vitamin) or of the acceptor (iron) or of both. This explanation is valid only if the enzyme-protein coordinated with the co-factor is present. [For part I see *H.A.*, 28: 3464.]

210. Archibald, J. A.
Nutrient status of Ontario peach and apple orchards as determined by leaf analysis.
Bienn. Rep. hort. Exp. Stat. Prod. Lab., Vineland, for 1957 and 1958, pp. 8-14, bibl. 14.

Samples of peach and apple leaves taken in 3 seasons showed varietal differences in contents of nutrients. In leaves from peach trees growing on 3 soils seasonal differences in N and K were particularly marked, while those of P, Ca and Mg were less striking. In 2 seasons higher leaf N was associated with higher yield on soil 1, but on soils 2 and 3 this relationship did not hold for a light-crop year. Yields on soil 1, which was well supplied with K, showed little difference between trees with high or low leaf K. On soils 2 and 3, which were drier than soil 1, trees with high leaf K produced 1·4–2 tons per acre more than did trees with low leaf K. On soil 1 there were no appreciable differences in yield between orchards with a high N : K ratio in the leaves and those with a low N : K ratio. On soils 2 and 3, however, a high N : K ratio was associated with low yield. With apples seasonal differences in leaf N and K levels were less marked than with peaches, but in 1955 leaf N contents did not decline as the season progressed. Variations in nutrient content were neither great nor consistent from year to year.

211. Martin, J. P., Jones, W. W., and Ervin, J. O.
Influence of exchangeable K and Na in the soil on growth and chemical composition of Lovell peach seedlings and other crops.
Agron. J., 1959, **51**: 418-21, bibl. 20, illus.

Lovell peach seedlings were grown in base-saturated Hanford sandy loam and Yolo loam soils with exchangeable K levels of 2, 8, 22 and 36% of the exchange capacity. At the 3 lowest K levels exchangeable Na was adjusted to 1, 13 and 27%. For comparative purposes onions, carrots, radishes, vetches and alfalfa were grown in similar soils prepared from Yolo loam. The peach seedlings and onion plants were analysed for Ca, Mg, K and Na, and dry weight data were obtained for all plants. All plants tolerated 22% or more of exchangeable K. Slight to moderate growth reduction and/or leaf injury was noted at 36% K for peach seedlings, onions, head lettuces, radishes and carrots; 13% exchangeable Na slightly reduced growth and injured peach seedlings. The 27% Na level reduced the growth of radishes, carrots and lettuces by about one-third at all K levels. In the K series about 4 and 7% leaf K values were associated with reduced growth of peach seedlings and onion plants respectively. In the Na series reduced growth of the peach seedlings occurred with only trace amounts of Na in the leaves, while in the onions reduced growth occurred when leaf Na values reached about 3%. [From authors' summary.]

212. Hibon, J.
Les conditions de l'efficacité de la fumure de l'abricotier au Maroc. **(Effective manuring of apricots in Morocco.)**
Fruits et Prim., 1959, **29**: 76-7, bibl. 1.

To overcome irregular bearing, fertilizers should be applied annually. Nitrogen should be given in February just before growth begins at 1·5–5·0 kg. 20·5% ammonium nitrate or 1·0–3·0 kg. 34% ammonium nitrate per tree, the rate depending on age, size and estimated yield. The lower grade is preferable on lime-deficient soils because it contains 22% soluble lime. Dressings of readily available P and K should be applied in June or July.

Growth and physiology

(*See also* 109, 121, 283, 289.)

213. Hilkenbäumer, F.
Spross- und Wurzelkronenentwicklung verschiedener Obstarten während der ersten sechs Standjahre auf Lehmboden. **(The development of stem and root system in different kinds of fruit on loam soil during the first 6 years.)**
ErwObstb., 1959, **1**: 127-32, bibl. 3, illus.

The roots of all the apple trees examined, except those on M.II, spread shallowly at an average depth of 25 cm. even in a deep, well aerated soil without a hard pan. In contrast, trees on M.II developed several tap roots, which were anchored in the soil at depths of up to 170 cm. Currant roots, on the other hand, spread so shallowly that they did not exceed an average depth of 12–15 cm. and suffered injury from cultivation between the rows. With all kinds of fruit, and especially with black currants, very shallow cultivation is therefore imperative. It has further been found that there is no point in loosening the subsoil at planting beyond a depth of 50 cm., provided that there is no hard pan. The lateral extension of the roots during the first few years requires mineral and humus applications over the entire area of the root spread and not only near the stem. The need to spread the manure widely is indicated by the formation of fibrous roots in the whole area of the root system. In the 6th year the spread of the roots exceeded that of the tops. In the same year the tops of plums filled about 60% of the space allotted to them, those of apples on M.IX and IV 50%, and those of morello cherry, apricot, peach and currant 30–40%. In the case of apples, with favourable nutritional conditions for roots and tops (aided by horizontal training of the shoots not needed as limbs), M.IV and M.IX formed equally extensive root systems in combination with different varieties. Growers are therefore justified in allowing the same space for varieties on both rootstocks.—Inst. Obstb. Univ. Bonn.

214. Soe, K.
Anatomical studies of bark regeneration following scoring.
J. Arnold Arbor., 1959, **40**: 260-7, bibl. 15, illus.

In order to determine the duration of the effect of scoring and the nature of bark regeneration, studies were made both with the slow-growing apple variety Prairie Spy and pear variety Seckel and with the fast-growing silver maple (*Acer saccharinum*) and a hybrid poplar (*Populus deltoides*). The trunk and branches were scored by cutting with a knife through the bark to, and often into, the xylem. The cuts were made either directly around the trunk or branch or in a diagonal spiral. The amount of callus formed in poplar and maple was more, and it appeared earlier, than in apple and pear. However, all 4 species produced new phloem and xylem at about the same time. The cambium was formed in about a week, but the complete restoration and functioning of the phloem required about 3 weeks. It is concluded that, if done at an appropriate time of year, a single scoring may check phloem transport for long enough to induce earlier and more prolific flowering and fruiting. If a single scoring is insufficient, the process may be repeated every 2 or 3 weeks.

215. Tutajuk, V. H., and Agaev, Ju. M.
The behaviour of green plastids in the cortex of fruiting and vegetative shoots of some fruit trees in a dry subtropical climate. [Russian, with English summary ½ p.]
Fiziol. Rast., 1959, **6**: 568-74, bibl. 22, illus.

Apple, pear and apricot. For similar work see *H.A.*, 28: 2180.

216. Feucht, W.
Das kräftige Fruchtholz des Apfels und die physiologischen Ursachen seiner überlegenheit im Fruchten. **(The vigorous fruiting wood of the apple and the physiological causes of its superiority in respect of fruiting.)**
ErwObstb., 1959, **1**: 110-12, bibl. 30.

A review of the literature on the physiology of fruiting in apple, with special reference to the work done at the Institut für Obstbau und Gemüsebau, Stuttgart-Hohenheim.

217. Lucke, R.
Die "optimale Fruchtsprossstärke" zweier Apfelsorten. **(The optimum size of the fruit spur in two apple varieties.)**
Gartenbauwiss., 1958, **23**: 477-93, bibl. 23, illus.

The tendency to form flowers and fruits was studied in the shoots of Belle de Boskoop grown on seedling stocks, of Gold Pearmain on seedling stocks and of Gold Pearmain on M.XVI and M.IX. Fruit spurs 1–15 cm. long were found to be about the optimum size, with the terminal buds offering the most favourable conditions for the initiation of fruit buds. Lateral inflorescences formed on long shoots or later inflorescences were shown to be less fruitful. The formation of flower buds in these less favoured positions occurs only in trees possessing a high flowering potential. With regard to the number of flowers per inflorescence, only short shoots under 1 cm. and the lateral inflorescences on long shoots of Gold Pearmain produced fewer flowers than the average. In respect of percentage fruit set and mean fruit weight, the thickest spurs had the best record.—Inst. Obstb. Gemüseb. landw. Hochsch. Hohenheim.

218. Kemmer, E.
Über Blütenbildung an der Basis von Apfelsämlingen. **(On the formation of flowers at the base of apple seedlings.)**
ErwObstb., 1959, **1**: 112-15, bibl. 1, illus.

Following a discussion of pertinent illustrations, the author concludes that the concept that the seedling base remains permanently sterile, i.e. juvenile, requires correction. [See also *H.A.*, 29: 1113.]—Inst. Obstb. tech. Univ. Berlin.

219. Ciampi, C.
Effetti della defogliazione sulle tappe della morfogenesi fiorale nel ciliegio, nel susino e nel pesco. **(Effects of defoliation on the stages of flower initiation in cherry, plum and peach.)** [English summary ½ p.]
Nuovo G. bot. ital., 1958, **65**: 460-94, bibl. 13, illus.

When defoliation was carried out in the earliest stages of bud formation most of the buds died. When it was carried out at a slightly later stage, but before the distinct differentiation of floral organs, most of the buds produced deformed flowers which dropped prematurely. However, if definite floral primordia had formed before defoliation, the only effect was a slight delay in flowering. These observations applied to all 3 species.—Univ. Firenze.

220. Goldacre, P. L., and Bottomley, W.
A kinin in apple fruitlets.
Nature, 1959, **184**: 555-6, bibl. 8, illus.

Crude extract from Granny Smith apples of 5–8 mm. diameter induced cell division in blocks of tobacco stem pith in the presence of 10^{-5} M indole-3-acetic acid (IAA). The response to a concentration representing 10 g. of apple tissue per 100 ml. of medium was earlier and greater than that to optimal concentrations of kinetin (10^{-6} M) or coconut milk (6%). More kinin per fruitlet was present in the flesh than in the ovules. Discs of apple fruit in which normal cell division had ceased were stimulated to resume this activity by the above extract plus IAA. Equivalent concentrations of extracts from apples 6–7 cm. in diameter showed no appreciable activity and higher concentrations were toxic.—C.S.I.R.O., Canberra.

221. Hendershott, C. H., and Walker, D. R.
Identification of a growth inhibitor from extracts of dormant peach flower buds.
Science, 1959, **130**: 798-800, bibl. 5.

A growth inhibitor in dormant peach flower buds was identified as naringenin (5,7,4′trihydroxyflavanone). The concentration of the substance has been closely correlated with the emergence of peach buds from rest [see *H.A.*, 26: 185 and 29: 1156].—N.C. St. Coll., Raleigh.

222. Brian, P. W., Petty, J. H. P., and Richmond, P. T.
Extended dormancy of deciduous woody plants treated in autumn with gibberellic acid.
Nature, 1959, **184**: 69, bibl. 2.

Fifteen weekly applications of a 50 μg./ml. GA spray were made to numerous species between mid-August and late November. In a number of them bud-break in the following spring was delayed by 1–3 weeks. In *Prunus avium* there was little effect on vegetative buds, but most flower buds remained dormant or died, or produced late, distorted or reduced flower clusters. Branches which only received spray drift produced normal flowers 3 weeks late.—Akers Res. Labs, I.C.I., Ltd., Welwyn.

223. Carlone, R.
Influenza delle gibberelline sullo sviluppo dei germogli e dei frutti di alcune cultivar di pesco. **(The effect of gibberellins on the development of shoots and fruits in some peach varieties.)** [English, French and German summaries 8 lines each.]
Frutticoltura, 1959, **21**: 353-62, bibl. 1, illus.

One-year-old twigs of young J. H. Hale and

Michelino peach trees were coated in mid-March, and again shortly before bud burst, with a 100 p.p.m. solution of mixed gibberellin A and gibberellic acid, containing a sticker. Bud burst was not advanced, but subsequent shoot growth was accelerated, increases in length over untreated controls being 25% in Hale and 50% in Michelino by mid-May. Using the same 2 varieties and also Aurora, the same solution was applied 4 times at approximately 15-day intervals to fruits, beginning at the small hazel-nut size. By early August, when a hailstorm curtailed the experiment, the treated fruits of Hale were 8·6 mm. longer and 10·8 mm. wider than untreated fruits, and corresponding increases in Michelino were 2·5 and 4·1 mm. The initial growth increase in Aurora was followed by a retardation, so that final fruit size was normal, but premature reddening and considerable russeting resulted from treatment.—Ist. Colt. arb., Univ. Torino.

224. Benko, B.
Hospodárenie jabloní s vodou. (The water regime of apple trees.) [English and Russian summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 671-80, bibl. 12, illus.

The foliar transpiration rates of 38 foreign and local varieties of apple, obtained by the Arland method, are tabulated. Although caution is necessary in interpreting these figures, the author insists that this fundamental physiological function is the most reliable basis for characterizing varietal performance.

225. Hillis, W. E., and Swain, T.
Phenolic constituents of *Prunus domestica*. III. Identification of the major constituents in the tissues of Victoria plum.
J. Sci. Food Agric., 1959, **10**: 533-7, bibl. 16.

Chromatographic examination of the extracts of various tissues disclosed little difference in the samples collected at different times of the year. Scopoletin, (+)-catechin, (—)-*epi*catechin, rutin and chlorogenic acid have been identified in the extracts. The strong blue fluorescence of the pathological heartwood under ultra-violet light was attributed to scopoletin. A pronounced difference exists between the phenolic constituents of the woody tissues of Victoria plum and those of the Asian *Prunus* spp. [From authors' abstract. For part II, see *H.A.*, 29: 2149.]—Low Temp. Res. Stat., Cambridge.

226. Skofenko, A. O.
The relationship between frost resistance and the ability of some fruit plants to accumulate ascorbic acid. [Ukrainian, with Russian summary.]
Nauk. zap. Kijivs'k. Un-t, 1957, **16**(1): 165-74, from *Ref. Ž.* (*Biol.*), 1958, No. 12, Abstr. 53,766.

Studies in 1952-1955 in the Kiev region showed that the leaves of 1-year-old shoots of frost-resistant varieties of apple, pear and apricot had a higher ascorbic acid content than those of frost-susceptible varieties. In 1-year-old shoots the ascorbic acid content was highest in the winter.

227. Pratt, C., Einset, J., and Zahur, M.
Radiation damage in apple shoot apices.
Amer. J. Bot., 1959, **46**: 537-44, bibl. 16, illus.

The pattern of shoot growth and anatomy of the shoot apex of Golden Delicious apple trees on M.IX rootstock are compared in normal trees and those growing under chronic gamma irradiation (average doses of 17–48 r per 20-hr. day) at Brookhaven National Laboratory. Bud damage in 6 varieties of apple trees is compared. Irradiated Golden Delicious formed lateral buds on the current year's shoot, but the following year these buds grew into spurs which failed to form a terminal bud ("budless" spurs) and enlarged to form "club tips" and "swollen spurs" in this and subsequent years. Inflorescences and floral meristems were rarely found, but, once formed, continued development. One-year-old budless spurs had a few leaves but neither an organized apical meristem nor leaf primordia. Many lateral buds from the gamma field, which were propagated without irradiation in early August, grew into long shoots with terminal buds. Scions removed from irradiation in November and inserted into normal trees showed lower survival, and many of their shoots were budless. This suggests that the capacity for normal growth of a bud damaged by chronic irradiation is greater in mid-summer than later in the year. With reference to percentage of budless shoots, Delicious, Golden Delicious and McIntosh were more sensitive to an average dose of 24 r per day and lower doses than were Cox, Macoun and Spy. Symptoms of radiation damage in apple buds during the first year were similar following acute or chronic irradiation. Degree of radiation damage, as expressed by death of apical meristems, was concluded to vary with stage of development of the bud, structure of the apical meristem, and genetic constitution. [From authors' abstract.]—N.Y. St. agric. Exp. Stat., Geneva, and Univ. Punjab, Lahore, W. Pakistan.

228. Burg, S. P.
Tracer experiments on the formation of ethylene by apple tissue.
Arch. Biochem. Biophys., 1959, **84**: 543-6, bibl. 6, illus.

A procedure for determining $C_2{}^{14}H_4$ is described. It was found that evenly labelled C^{14} sucrose, injected into the ovaries of apple fruits, gave rise to small amounts of ethylene, but C^{14} carboxyl-labelled acetate was less effective. It is suggested that the precursors of ethylene may be distinct from the major pathways of metabolism.—Harvard Univ., Cambridge, Mass.

Training and pruning.

(*See also* 120, 182.)

229. Bodi, I.
Creșterea pomilor în pepinieră fără lăstari de îngroșare. (**Obtaining fruit trees without feathers in the nursery.**) [English, French, Russian and German summaries $\frac{3}{4}$ p. each.]
Grăd. Via Liv., 1959, **8**(4): 41-4, illus.

Rubbing off the buds from the stems of young apple, pear and plum trees, 2–3 times during the summer, resulted in sturdier, smoother stems, with fewer calluses, than pinching or cutting back the young side shoots. The method also considerably reduced production costs. [See also *H.A.*, 29: 2104.]

230. Upshall, W. H.
Throw away those ladders!
Amer. Fruit Gr, 1959, **79**(11): 12-13, illus.

Apple and pear growers in Ontario are growing trees on dwarfing rootstocks and training them to wires or posts in an effort to reduce picking costs. Three methods of support are used, namely (*a*) a post for each tree, which is tied in in 2 or 3 places, (*b*) a supporting fence of 2 wires, or (*c*) a fence of 4 wires. Recommended spacing for the first 2 systems is 10 ft. in the row by 20 ft. between the rows, and for the third system 12×10 ft. Cumulative yields per acre over 20 years are 2 to 5 times higher for espalier than for standard trees.—Vineland hort. Exp. Stat., Ont.

231. Lucke, R.
Zum Waagrechtbinden der Langtriebe beim Apfel. (**Tying apple shoots horizontally.**)
ErwObstb., 1959, **1**: 135-40, bibl. 23, illus.

In these experiments tying down reduced the vegetative growth of apple shoots, though it led to increased flower formation only if certain conditions were fulfilled. The operation is considered undesirable for older trees but essential in the training of young trees.—Inst. Obstb. Gemüseb. landw. Hochsch. Hohenheim.

232. Maggs, D. H.
The pruning response of one-year apple trees.
Ann. Bot. Lond., 1959, **23**: 319-30, bibl. 12.

The response to pruning, in the simple woody system exemplified by 1-year-old rooted apple shoots, could be summarized by the equation

$$\frac{\text{Weight of stem of new shoots}}{\text{Increase in weight of old stem}} = 0{\cdot}6\,\frac{\text{Old stem length before pruning}}{\text{Old stem length after pruning}} - 0{\cdot}3,$$

irrespective of the amount of growth or of whether all new shoots or only two were allowed to develop. In a group of smaller plants the proportion of new stem increased slightly. The response could be largely attributed to a close relation between the total increment and the thickening of the old stem which was found to be

$$\frac{\text{Increment in old stem}}{\text{Length of stem}} = 0{\cdot}0063 \text{ total increment} + 0{\cdot}039.$$

Increase in weight of the plants was favoured by treatments promoting early bud-break and rapid development of leaf area. It was not simply related to pruning. [Author's abstract.]—East Malling Res. Stat., Kent.

233. Ljones, B., and Husabø, P.
Skjeringsforsøk med epletre ved Norges Landbrukshøgskole. (**A pruning trial with apples at the Agricultural College of Norway.**)
Frukt og Baer, 1958, **11**: 20-5, bibl. 6, illus.

During the years 1942–56 a pruning trial was carried out with apples on seedling rootstocks in which several methods were compared. The following, among other, observations were made: Hard pruning stimulated shoot growth before the bearing age was reached, but as most of the new growth was removed again the following year the net increase was greatest without pruning. Yields were highest in the early years when the trees were pruned at planting only. By contrast, spur pruning reduced yields by 38% in 1954, and "ordinary" pruning (which is described) by 20%. In general, the size of the fruit was greatest with the hardest pruning treatment. The effect on fruit size of pruning method is discussed for a few varieties.

234. Said, M., and Ali Shah, S. M.
Pruning requirement of peach trees, variety 6-A.
Agric. Pakist., 1959, **10**: 65-72, bibl. 8.

The results of a pruning experiment, started in 1946 on one-year-old trees and continued for 7 years, are reported. No pruning resulted in high yields of inferior fruits and premature senescence of the trees. Light thinning and light cutting back of occasional shoots gave the highest yields and cash returns. Light cutting back of all shoots led to the greatest increase in tree girth, while hard pruning markedly reduced yields but very considerably increased the size and quality of the fruit.

Pollination and fruit development.

(*See also* 181, 217, 223.)

235. Feucht, W.
Zur Schwebefähigkeit des Baumobstpollens. (**On the ability of fruit tree pollen to drift in the air.**)
ErwObstb., 1959, **1**: 151-2, bibl. 4.

In view of its slow rate of falling (about 1–10 cm./sec.) pome and stone fruit pollen can theoretically drift over long distances. However, the absence of fast air currents in an orchard and the moderate altitude from which the pollen starts was found generally to reduce the distance to below 8 m.—Inst. Obstb. Gemüseb. landw. Hochsch. Hohenheim.

236. Williams, R. R.
The effective distance of a pollen source in a cider apple orchard.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 61-3.

Data obtained over 3 years from 2 orchards indicate that the limit of the effective distance of a pollinator apple tree is 50–90 ft. Weather conditions at flowering time seem to influence the seed number in fruit adjacent to the pollinators, but do not alter the range over which insect activity is apparent.

237. Botez, I.
Contribuţiuni la cunoaşterea comportării soiului de măr Ionathan în procesul de polenizare. **(A study of the pollination characteristics of the apple variety Jonathan.)** [English, Russian and Hungarian summaries ½ p. each.]
Lucr. şti. Inst. agron. "Dr. Petru Groza", Cluj, 1958, **14**: 191-203, bibl. 22.

The pollen of Jonathan germinated most successfully in a 9% sugar solution at 23° C. Tables are given showing results of cross-pollination tests between Jonathan and 41 other varieties. It was able to fertilize 80%, and be fertilized by 67%, of the varieties. Self-compatibility varied with location.

238. Plumier, W.
Fécondation et fructification de la variété de pommier Reinette de France. **(Fertilization and fruiting in the apple variety Reinette de France.)**
Fruit belge, 1959, **27**: 97-103.

Self- and cross-fertilization carried out by hand and by bees in the greenhouse, by bees in isolation frames and by hand in the orchard showed that Reinette de France is completely self-fertile and self-productive. Court Pendu was not a good pollinator for it.—Stat. Amél. Plantes fruit. maraîch., Grand-Manil, Gembloux.

239. Kemmer, E., and Steckel, W.
Über den Zusammenhang zwischen Blüte, Ansatz und Ertrag bei Kernobst. **(On the relationships between flowering, fruit set and yield in pome fruits.)**
ErwObstb., 1959, **1**: 90-5, bibl. 14.

In the spring frost year of 1957 and again in 1958 the flowers and fruits of one tree each of 40 apple and 4 pear varieties were counted on 4 different dates. The results are tabulated. Fruit set per 100 flowers amounted to 21 fruits in 1957 and to 35 fruits in 1958, but as a result of the June drop the number of fruits per 100 flowers eventually retained on the trees was almost the same in both years, viz. 8 and 9 respectively. Time of fruit drop was compared in the different varieties. The number of flowers per inflorescence was largely determined by the variety, the apple varieties examined averaging 5 flowers. The varieties are classified according to the number of fruits they bore per inflorescence at harvest time. Data on yields of the experimental trees are also supplied.—Inst. Obstb. tech. Univ. Berlin.

240. Abbott, D. L.
The effects of seed removal on the growth of apple fruitlets.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 52-6, bibl. 5, illus.

Seeds were removed from apple fruitlets, with the aid of a special cutting tool here illustrated, at intervals during the growing season to determine their effects on fruit development. In the initial 1 or 2 weeks after fertilization seeds apparently play a complex role, which was not investigated in this study. After this initial period, however, it seems likely that the only role of the seed is the prevention of fruitlet abscission, and that it can be simulated by the application of NAA. This effect on abscission is of limited duration, and after about 7 weeks from petal fall a stage is reached when fruit growth proceeds normally in the absence of both seed and added growth substance. It is tentatively suggested that the attainment of this condition may account for the cessation of June drop.

241. Steche, W.
Auswirkungen der Bienenbestäubung auf Ertrag und Fruchtbildung bei der Birne Köstliche von Charneu. **(The effects of pollination by bees on yield and fruit formation in the pear variety Fondante de Charneu.)**
ErwObstb., 1959, **1**: 132-4, bibl. 1.

In one of two comparable pear orchards 20 bee hives were placed at the rate of 10 hives per hectare. Although the fruits of this orchard were somewhat smaller than the controls, yields were more than three times as high. The number of seeds per fruit was almost identical in both orchards. In the bee-pollinated orchard there was a clear correlation between number of seeds and fruit shape, the higher the number of developed seeds the better being the shape of the fruit. No such correlation existed in the orchard without bees. Pears of the bee-pollinated plot were smaller and broader in relation to their length. An increase in width as related to the number of seeds occurred only in fruits of the bee-pollinated plot.—Inst. Bienenkde, Univ. Bonn.

242. Congdon, N. B., and Woodhead, C. E.
Erratic cropping of Winter Nelis pears in Hawke's Bay.
N.Z. J. Agric., 1959, **98**: 575-6, illus.

The reason for the erratic cropping of Winter Nelis in this area was found by experiment to be inadequate pollination, not nutritional deficiency. Desiderata for proper pollination are given [see also *H.A.*, 29: 2186h.]

243. Blaja, D.
Dezvoltarea partenocarpică a perelor Untoasă Liegel si Untoasă Bosc. (**Parthenocarpic development of the pear varieties Beurré Liegel and Beurré Bosc.**) [English, French, Russian and German summaries $\frac{1}{2}$ p. each.]
Grăd. Via Liv., 1959, **8**(2): 29-31, illus.

When the flowers were de-anthered, 26% produced parthenocarpic fruit in Beurré Liegel, and 15·5% in Beurré Bosc.

244. Eaton, G. W.
A study of the megagametophyte in *Prunus avium* and its relation to fruit setting.
Canad. J. Plant Sci., 1959, **39**: 466-76, bibl. 13, illus.
The megagametophyte in the sweet cherry *Prunus avium* L. and its relation to fruit setting.
Diss. Abstr., 1959, **20**: 447, being *L.C. Card No. Mic.* 59-2736 of 82 pp.

In 1957, under high temperatures, the proportion of embryo sacs with functional egg cells decreased rapidly following anthesis. In 1958, under low temperatures, the maximum proportion of functional embryo sacs at any one time was much lower than in 1957, and the proportion of embryo sacs with functional egg cells began to decrease within 2 days of anthesis. At anthesis in both years sufficient functional embryo sacs were present to allow a commercial set of fruit. The importance of cross-pollination immediately at anthesis is emphasized. The conclusions are supported by studies of pistils hand-pollinated at intervals after anthesis. [From author's abstract.]—Ohio St. Univ.

245. Crane, J. C., Bradley, M. V., and Luckwill, L. C.
Auxins in parthenocarpic and non-parthenocarpic figs.
J. hort. Sci., 1959, **34**: 142-53, bibl. 23, illus.

Studies of the auxin content of developing fig fruits revealed a sudden 30-fold increase in auxin concentration in the variety Calimyrna at the time of formation of the endosperm tissue. A similar and even larger rise in the parthenocarpic Mission variety was associated with the development of a parthenogenetic endosperm. By chromatographic analysis this auxin was shown to be different from those present at earlier and later stages of growth, and to be chemically distinct from indoleacetic acid. Its function is thought to be the prevention of fruit drop. No evidence was found that the rate of fruit enlargement was in any way dependent on the auxin concentration. [Authors' synopsis.]—Univ. Calif., Davis, and Long Ashton Res. Stat., Bristol.

246. Crane, J. C., and Campbell, R. C.
Fruit and vegetative responses of the Calimyrna fig to gibberellin.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 11-14, bibl. 2, illus.

In 1957, when fig shoots were sprayed with gibberellin at concentrations ranging from 25 to 1,000 p.p.m. on June 14, and thereafter bagged to prevent natural caprification, a high positive correlation was found between the length of new shoots induced, the number and length of internodes and the concentration of gibberellin used. All dosages except the lowest produced 100% parthenocarpic fruit set, as against 82% natural set of caprified figs in the controls. In 1958 concentrations of 5, 10 and 20 p.p.m. were applied on April 16, May 14, and June 16, but these lower concentrations had no significant effect on shoot growth, nor was the parthenocarpic fruit set as great as the natural caprification in the controls.

Thinning and spraying for cultural purposes.

(*See also* 121.)

247. Säkö, J.
Omenapuiden kemiallinen raakileenharvennus. (**The chemical thinning of apples.**) [English summary 1 p.]
Valt. Maatalousk. Julk. **174**, 1959, pp. 22, bibl. 22, illus.

Of several NAA compounds and DNC tested for 4 years on a number of apple varieties, NaNAA gave the most consistently satisfactory thinning results. The applications were made 11–14 days after full bloom at a concentration of 5 p.p.m. plus 0·125 Tween 20. Fruit size was markedly improved by the treatment.—Agric. Res. Centre, Dep. Hort., Piikkiö.

248. (Batjer, L. P.)
Sevin fills dual role as thinner, pesticide.
Bett. Fruit, 1959, **54**(2): 20.

Sevin (at $1\frac{1}{2}$ lb. per acre) applied 16 days after full bloom has achieved moderate thinning in 7 Delicious orchards. When applied 3–4 weeks after full bloom, no thinning has resulted.

249. Bömeke, H.
Über die Anthozyanbildung, insbesondere bei Äpfeln. (**The formation of anthocyanin, especially in apples.**)
Der Tuzeteinsatz im Obstbau unter Berücksichtigung der Anthozyanbildung. (**The use of Tuzet on fruit crops, with special reference to the formation of anthocyanin.**)
Mitt. ObstVersuchsringes Jork, 1959, **14**: 137-9, bibl. 9, and 139-40.

In the first article it is suggested that the formation of anthocyanin in apple skins may be regarded as a symptom of unfavourable environmental conditions.

In the second article spraying with Tuzet is recommended for increasing the colour of apple fruits, in addition to controlling scab, provided allowance is made for some reduction in shoot growth following treatment. The increased colour is believed to be partly due to a reduction of the chlorophyll in the fruit skin. The growth of the root tips is also probably inhibited by the spray, and this leads to a decrease in nitrogen uptake and to an excess of carbohydrates, thus favouring the formation of anthocyanin.

250. Reinken, G.
Über den Einfluss des Pflanzenschutzmittels Tuzet auf die Früchte und das Triebwachstum verschiedener Apfelsorten. **(On the effect of the fungicide Tuzet on the fruits and the growth of several apple varieties.)**
ErwObstb., 1959, **1**: 154-6, bibl. 8.

Tuzet consists of TMTD, ziram and an agent containing arsenic. Irrespective of its merits as a fungicide, which were not tested, the compound enhanced fruit colour in all varieties without impairing storage life. Fruit size was increased in certain varieties, but yields were somewhat reduced in Golden Delicious. The inhibition of growth observed in this variety was not significant.—Inst. Obstb. Univ. Bonn.

251. Demuro, A.
Prova di lotta contro la cascola pre-raccolta del pero. **(Trial on the control of pre-harvest drop in pears.)**
Riv. Ortoflorofruttic. ital., 1959, **43**: 264-8, bibl. 9.

An unnamed hormone product was sprayed on pear trees of 9 varieties in early September and reduced fruit drop, on average, from 13·21 to 4·23%. The results were best with Beurré Clairgeau, in which loss was reduced from 14·49% to nil.

252. Kemp, W. S., and Wilson, D. W.
Hormone application to apricots and peaches.
Orchard. N.Z., 1959, **32**: 171-5, bibl. 7.
Horticulture Division, New Zealand Department of Agriculture.
Hormone application to apricots and peaches.
Orchard. N.Z., 1959, **32**: 185.

Five years' trials with apricots have shown that 2,4,5-T may be used successfully for controlling pre-harvest drop, and for hastening maturity and increasing fruit size, especially with early maturing varieties. Recommendations are given for its commercial application. With peaches the commercial application of 2,4,5-T or 2,4,5-TP is not yet recommended, but there are indications that 2,4,5-TP is the more promising material. Round, white-fleshed peaches are probably more successfully treated than elongated and yellow-fleshed types. In a footnote to the first article, the Horticulture Division recommends re-spraying if rain occurs within 24 hours of application.

253. Cripps, J.
The spray-thinning of Newcastle apricots.
J. Agric. W. Aust., 1959, **8**: 361.

Spray thinning with the sodium salt of DNC is effective if the spray is applied to trees when two thirds of the blossoms are open. This may necessitate several applications after a warm winter when blossoming in an orchard may extend over 10 days.

254. (Bergh, O.)
Thinning of peaches.
Dec. Fruit Gr, 1959, **9**: 204.

Trees should be thinned on the basis of 30 fruits per inch of trunk circumference. Thinning should be carried out after fruit drop and before pit hardening, leaving one fruit per 6 inches of shoot.

Fruit composition.

(*See also* 47, 65, 98, 200, 220, 249, 281, 296, 376.)

255. McClendon, J. H., Woodmansee, C. W., and Somers, G. F.
On the occurrence of free galacturonic acid in apples and tomatoes.
Plant Physiol., 1959, **34**: 389-91, bibl. 20.

An acid fraction isolated from 70% 2-propanol extracts of apples and tomatoes contained a component identical in R_f and aniline colour test to galacturonic acid. Guluronic, glucuronic, and mannuronic acids were not found. In addition, the apple samples contained a minor, but complex, uronic acid component. Data on the quantity of aqueous-alcohol-soluble uronic acid present at various stages of fruit ripeness showed very low values in unripe tomatoes and in ripe as well as unripe apples (4 to 15 μg./g. fresh fruit). This increased at least 10-fold upon the softening of the fruit, but was still of an order of magnitude less than the amount of D-galacturonic acid bound in pectin. [Author's summary.]—Univ. Del., Newark.

256. Poapst, P. A., Ward, G. M., and Phillips, W. R.
Maturation of McIntosh apples in relation to starch loss and abscission.
Canad. J. Plant Sci., 1959, **39**: 257-63, bibl. 5, illus.

A field test, which utilizes a sequence of starch-iodine patterns for estimating picking time in McIntosh, was related to the starch content of that fruit. Further, it was observed that starch content and abscission appeared to be associated, and that this association varied with the seasonal temperature. [Authors' abstract.]—Canada Dep. Agric., Ottawa, Ont.

257. Whiting, G. C., and Coggins, R. A.
The non-volatile organic acids of cider-apple juices: changes during growth and storage of the fruit.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 169-74, bibl. 11.

A method for the quantitative determination of the major, and some of the minor, non-volatile organic acids in apple juices, using a silica-gel column, is described. During growth of the fruit there was a considerable fall in total acidity due to decreases in the concentrations of quinic and chlorogenic acids and, to a less extent, of malic acid. During storage of the fruit, total acidity and the content of malic acid decreased while the contents of citramalic, quinic, shikimic and chlorogenic acids increased; citric acid showed some increase in the variety Dabinett only. [Authors' summary.]

258. Whitaker, J. R., and El Gharbawi, M.
Tenderization of meat with proteolytic enzymes.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 7-10.

Studies on the use of ficin from green figs for tenderizing beef. [For earlier work see *H.A.*, 28: 3371.]

Harvesting, packing and marketing.

259. Fridley, R. B., Adrian, P. A., and Parks, R. R.
A mechanical harvester for deciduous fruits and nuts.
Shipley, R. M., Jr.
Commercial development of the University pickup machine and a simple land plane.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 20 and 21-4, illus.

Both articles describe the machine developed at California University, Davis, for the mechanical harvesting of fruits and nuts, such as figs, prunes, walnuts and almonds, when shed from the tree. In trials on prunes, no fruit was damaged, little dirt was picked up and costs were 25% of hand-picking.

260. Lamouria, L. H., and others.
Mechanical fruit harvest—olives, peaches, and pears.
Pap. annu. Mtg Amer. Soc. agric. Engnrs **58-64**, Santa Barbara, Calif., 1958, from abstr. in *Agric. Engng St. Joseph, Mich.*, 1958, **39**: 653.

Clingstone peaches were mechanically harvested with over 75% of the fruit free from visible injury immediately following harvest. Pear injury varied with tree height. The vigorous shaking given the trees by boom-shaker equipment produced very little limb breakage and apparently no tree injury. Tree structure and fruit maturity are the greatest problems in the successful mechanical harvesting of deciduous fruit destined for the cannery [see also *H.A.*, 27: 3172]. The paper includes a description and comparison of the equipment used in the investigations. [For olive harvesting, see *H.A.*, 28: 4042.]

261. McBirney, S. W., and Van Doren, A.
Pallet bins for harvesting and handling apples.
Stats Circ. Wash. St. agric. Exp. Stats **355**, 1959, pp. 11, bibl. 7, illus.

Fruit bruising and other injury studies have shown that apples harvested in bulk bins had slightly fewer injuries than those harvested in boxes. Bruising increased with the depth of bin used and was more marked after storage. A 24–26-in. bin depth is recommended as the maximum if apples are to be stored. Time studies on harvesting apples in bins or boxes showed savings of 17–25 man hours per 1,000 boxes when bins were used. A given storage space can hold about 20% more fruit when bins are used instead of boxes, both being stacked to an equal height, and this can often be further increased since bins can be stacked higher than boxes. [See also *H.A.*, 29: 3290.]

262. McBirney, S. W.
Pallet bins for harvesting apples in the Pacific Northwest.
[*Mimeo. Pap.*] *annu. Mtg For. Prod. Res. Soc., 1959*, San Francisco, Calif., pp. 10, bibl. 17.

With special reference to design and quality of bins.

263. Washington County Extension Service.
1959 container survey of N.C. Washington packing houses.
[*Mimeo. Pap. Wash. St.*] *County Ext. Serv.*, 1959, p. 1.

Increased use of bins for harvesting and storing apples, and of fibre containers for marketing.

264. Hilkenbäumer, F., and Reinken, G.
Mechanisierung der Transportarbeiten im obstbaulichen Betrieb durch den Einsatz von Paletten. **(The mechanization of transport on the fruit farm by the use of pallet bins.)**
ErwObstb., 1959, **1**: 107-9, bibl. 5, illus.

Out-door and in-door uses, construction and economics discussed.

265. Krijgsman, H. K., and de Ruiter, J.
Ervaringen met een nieuw type plukemmer. **(Tests with a new type of picking pail.)**
Fruitteelt, 1959, **49**: 876-7, illus.

Trials showed that fruit was less damaged when carefully picked directly into a box (raised on a stand) than when picked into a special pail.

Damage with the picking pail was particularly high with Transparent de Croncel. Growers' trials with the new pail showed that several points need improvement.—I.T.T., Wageningen.

266. ANON.
Clean, washed apples.
Amer. Fruit Gr, 1959, **79**(11): 23, illus.

A washer, with a capacity of 125–150 bushels per hour, is described.

267. GASTON, H. P., LEVIN, J. H., AND HEDDEN, S.
Experiments in harvesting cherries mechanically. A progress report.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 805-11, illus.

The cost of operating a mechanical picker was only 40% of that of hand picking, but about 10% of the crop was left on the trees. The unharvested tenth was, however, of poor size and quality, and mechanical harvesting still remained more economical than manual picking.

268. STOKES, D.
New packages for quality fruits.
Amer. Fruit Gr, 1959, **79**(8): 7, 17, illus.

For pome and stone fruits.

269. SHAFFER, P., AND OTHERS.
Packaging and price-marking produce in retail food stores. A study of improved methods of marketing agricultural products.
Mktg Res. Rep. U.S. Dep. Agric. **278**, 1958, pp. 85, bibl. 10, illus.

Including apples, citrus, bananas, melons, lettuce and onions.

270. MATERAZZI, M.
Alcuni aspetti del mercato delle mele nei paesi del M.E.C. **(Some aspects of the market for apples in countries of the European Common Market.)**
Frutticoltura, 1959, **21**: 503-16, illus.

271. GRISSO, R. D., AND JOHNSON, J. M.
Elements of success in marketing Appalachian apples.
Bull. Va agric. Exp. Stat. **507**, 1959, pp. 43.

Recommendations to help growers improve their competitive position.

272. STALLINGS, D. G., AND SAMMET, L. L.
Plum packing costs reduced.
Calif. Agric., 1959, **13**(10): 2, 8, illus.

Packing costs for interstate shipment using a test carton holding 25 lb. of plums were compared with those of the standard 4-basket crate of 28 lb. The initial cost of the carton was less than that of the crate, and costs were further reduced by bulk-filling as compared with hand packing.—Univ. Calif., Los Angeles and Berkeley.

Storage.

(*See also* 198, 1460.)

273. PFLUG, I. J., AND BRANDT, M. W.
Cost of Michigan fruit storage buildings as affected by size and type of construction.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 778-90, bibl. 4, illus.

Floor and roof costs per sq. ft. were not appreciably affected by size, whereas wall, foundation and footing costs were directly related to both size and shape. Refrigerating costs per unit volume were inversely proportional to volume. Tables are given from which the total costs of storage buildings of different types of construction can be estimated.

274. PERTICARÀ, G.
Le attrezzature frigorifere italiane per i prodotti agricoli. **(Italian cold storage installations for agricultural products.)**
Ital. agric., 1959, **96**: 683-701, illus.

A review, covering storage and transport.

275. LANDFALD, R.
Undersøkelser av temperaturvariasjonen i lagerrom. **(Studies on temperature variations in storage rooms.)**
Frukt og Baer, 1958, **11**: 60-8, bibl. 2, illus.

With different types of cold store used for fruit.

276. HILKENBÄUMER, F., AND BUCHLOH, G.
Kühlung von Obstlagerräumen mit Frischluft unter Verwendung von Luftwaschgeräten. **(The cooling of fruit storage rooms by fresh air, using scrubbers.)**
ErwObstb., 1959, **1**: 87-90.

With graphs on temperature and R.H. readings, with scrubbers and ventilators switched on and off.

277. (ROULAND, R. H.)
This new scrubber may revolutionize costs of apple storage.
Comm. Gr, 1959, No. 3326, p. 495, illus.

A scrubber for gas stores is described, which uses monoethanolamine as the absorbing liquid. It costs £375, but running costs are less than 3d. per hour.

278. HUELIN, F. E., AND KENNETT, B. H.
Nature of the olefines produced by apples.
Nature, 1959, **184**: 996, bibl. 8.

Analysis of the ethylene given off by Granny Smith apples indicated that normal olefines from propylene to hexene cannot be present in proportions greater than 1 part of higher olefine to 1,000 parts of ethylene. All unsaturated hydrocarbons cannot be excluded, but there was no evidence of saturated hydrocarbons.—C.S.I.R.O., Homebush, N.S.W.

279. MEIGH, D. F.
Nature of the olefines produced by apples.
Nature, 1959, **184**: 1072-3, bibl. 3.

Analysis of the ethylene in air samples from fruit stores containing Edward VII apples indicated the presence of very small quantities of acetylene, ethane, propylene and propane. Details of the method of gas chromatography used are given.—Ditton Lab., D.S.I.R., Maidstone, Kent.

280. NICOLAISEN-SCUPIN, L., AND NICOLAISEN, N.
Characterisation of damage caused in the cold storage of apples, especially by freezing. [German?]
Kältetechnik, 1959, **11**: 44-8, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-177.

Apples irradiated by ultra-violet light from a quartz bulb show colours which are characteristic of the relative soundness of the fruit. It is possible to distinguish without doubt between physiological cold storage deterioration and freezing damage.

281. BÜNEMANN, G., DEWEY, D. H., AND KENWORTHY, A. L.
The storage quality of Jonathan apples in relation to the nutrient levels of the leaves and fruits.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 820-33, bibl. 28.

The nutrient status of the fruit and leaves and the keeping qualities of the fruit were studied in 16 well managed orchards during the 1956 and 1957 seasons. The mineral content of the mature fruit was lower than that of the leaves except for boron, and that of the immature fruits was lower for Ca, Mg, Fe and Mn. Significant positive correlations were found between the fruit and leaf contents of N, P, K and Mn, but not of Ca and Cu. Flesh firmness was affected solely by N. Internal breakdown during storage was associated with low K status. Controlled atmosphere storage at 32° F. was definitely superior to air storage at 35° for delaying ripening and preventing the development of Jonathan spot.

282. HILKENBÄUMER, F., AND REINKEN, J.
Erkenntnisse über das Auftreten der Stippigkeit bei Äpfeln im Jahre 1958 und vorbeugende Möglichkeiten zu ihrer Vermeidung. **(On the incidence of bitter pit in apples in the year 1958 and the possibility of its prevention.)**
ErwObstb., 1959, **1**: 47-50, 67-70, bibl. 43, illus.

This review deals with origin, causes and preventive measures, among which a good supply of humus is considered the most important.

283. PATTERSON, M. E.
The relationship of factors affecting apple scald to the fundamental nature of the disorder.
Diss. Abstr., 1959, **20**: 20-1, being *L.C. Card No. Mic.* 59-1635 of 145 pp.

Scald in stored apples was delayed by 1% O_2 or by increasing CO_2 concentrations up to 12%, provided that the corresponding CO_2 or O_2 levels were kept near those of the natural atmosphere. Carbon dioxide concentrations above 12% resulted in increased scald and in CO_2 toxicity. Low O_2 and increased CO_2 concentrations attained inside polythene liners acted synergistically. Delayed sealing increased scald and caused fruit injury. The O_2 and CO_2 environments that reduced metabolic activity delayed the onset of scald. Highly-coloured fruit did not scald in storage. Artificial light applied in storage induced red colour development in green fruit, if applied before the scald induction period was complete. A hot-water blanching treatment that stopped scald, and a temperature coefficient for the scald reaction of 1·8, indicated the enzymatic nature of the reaction. Treatment with reducing agents prevented scald after removal from storage. Manometric determinations showed no difference in polyphenoloxidase activity between fruit that would and would not scald. Three prominent substrates of polyphenoloxidase were separated from apple skin extracts by paper chromatography, but all three substances had nearly disappeared in fruit that had scalded. Amounts of ascorbic acid in skins late in the storage season did not seem to be related to scald. An explanation is advanced for the control of scald achieved with mineral oil, which states that control is due to internal CO_2 and O_2 concentrations, and not to the absorption of apple volatiles. It is suggested that scald substrates, after appearing in the fruit, are prevented from browning by the presence of reducing agents, and by a protective effect that accompanies the full development of colour. Poorly-coloured fruit will scald after the reducing substances disappear. Any treatment which delays the disappearance of reducing substances, promotes colour or inactivates the browning enzyme will control scald.—Purdue Univ.

284. BEHR, L.
Experimentelle Untersuchungen über die "Wollstreifen" des Apfelkerngehäuses. **(Experimental studies of the "woolly stripes" in apple cores.)**
Reprinted from *Flora*, 1959, **147**: 167-85, bibl. 20, illus.

A study of the origin and anatomy of "woolly stripes", which occurred in the core of stored fruits, indicated that they were hyperplasia of heteroplasmic tissues.

285. MCGLASSON, W. B., AND BOTTING, G. W.
Ripe spot in Statesman apples.
J. Agric. S. Aust., 1959, **62**: 362-4, bibl. 2, illus.

Spraying the trees with TMTD did not control target spot (*Gloeosporium album*) in Statesman apples. A storage trial, however, led to the following recommendations: (1) avoid long storage of fruit picked after the ideal harvesting period, namely, the last 3 weeks of April in South Australia, and (2) if light-crop fruit has to be stored, pick it well within the ideal harvesting period and do not store it after the end of August.

286. Brook, P. J.
Experiments on the control of ripe spot on Sturmer apples.
N.Z. J. agric. Res., 1959, **2**: 463-74, bibl. 4.

Spraying with PMC up to mid-December and with captan for the remainder of the season controlled target spot (*Gloeosporium* spp.). Storage at 36–38° F. considerably inhibited target spot development. A lapse of several days between picking and cool storage did not affect incidence in fruit picked at the normal date and stored for 6 months.

287. Corke, A. T. K.
The effect of cover crops on the susceptibility of Cox's Orange Pippin apples to infection with *Gloeosporium perennans.*
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 118-24, bibl. 7.

Records of the rotting of Cox's Orange Pippin fruits, picked from trees in a cover crop/manurial experiment and inoculated with *Gloeosporium perennans*, suggested a correlation between the rate of rotting and the level of N in the tree. In fruits of the same mean weight from the same cover treatments, a higher rate of rotting was recorded on fruits from trees that had received additional N. In 1958, however, fruits from trees under perennial rye and timothy given additional N rotted more slowly than those from corresponding trees given the basic level of N. [Author's summary.]

288. Adams, R. E., and Tamburo, S. E.
A practical means of reducing storage rots of apple and post-harvest rots of peach.
Curr. Rep. W. Va Univ. agric. Exp. Stat. **22**, 1959, pp. 12.

Spray or dip treatments of apple field boxes with captan or glyodin one month before harvest reduced fruit rots in storage to 1–4%, as compared with 8–14% rots on fruit handled in untreated boxes. Hale Haven peaches stored in boxes treated with captan or paste sulphur also showed much less rotting than fruits held in untreated boxes. [For an earlier note see *H.A.*, 29: 2366a.]

289. Porritt, S. W.
Effect of temperature on physiology and storage quality of pears.
Diss. Abstr., 1959, **20**: 841, being *L.C. Card No. Mic.* 59-3411 of 72 pp.

The storage life of pears was, in general, reduced at an accelerated rate as the temperature increased. Small differences in temperature around 30° F. resulted in great differences in storage life, that of Bartlett being increased by 40% at 30° F. as compared with 32° F. The total amount of CO_2 respired during storage life diminished with rising temperature. A period of low metabolic activity after picking persisted for about 4 days with Bartlett, and for more than 50 days with Anjou at 50°, 60° or 70° F. Anjou pears ripened normally at 70° F. only after a period of cold storage. The apparent lack of adverse effects of a delay in cooling the fruit is attributed to this low metabolic activity. Intermediate temperatures during slow cooling produced more harmful effects on storage life than 2–3 days' exposure to 70° F. followed by rapid cooling. Maximum storage life was obtained when fruit was cooled to 30° F. within 4 days of harvest.—Ore St. Coll.

290. Ulrich, R., and Paulin, A.
Cooling of Passe-Crassane pears. [French ?]
Rev. gén. Froid, 1958, **35**: 483-90, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-177.

Fruit grown in different areas was stored at 0, 4 and 18° C.; that stored at 0° was raised to 18° after 11 weeks. Discontinuous cold treatment at 12° resulted in ripening, but there was lack of flavour: three weeks at this temperature followed by ripening at 18° gave satisfactory results. Several other permutations were examined and reported. With 2% ethylene ripening appeared normal after storage at 0°, but taste was poor; at 18° ripening was satisfactory in all respects. [See also *H.A.*, 27: 2176.]

291. Bellavite, F.
Osservazioni sull'evoluzione biologica della mosca delle ciliege in ambiente anomalo. **(Observations on the biological development of the cherry fruit fly under abnormal conditions.)**
Progr. agric., 1959, **5**: 808-9, illus.

Preliminary experiments showed that cherries containing unhatched eggs of *Rhagoletis cerasi*, harvested at commercial maturity and stored for 10 days at 8–10° C. (the temperature of refrigerated transport vans), developed very little infestation.

292. Kishi, T., Hara, T., and Yamashita, R.
Cold storage tests with canning peaches. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1959, **28**: 81-6, bibl. 8.

Kanto peaches stored at 0°–5° C. for 3 weeks lost about 10% of their fresh weight. Flavour deterioration decreased as the period of storage lengthened. The storage quality of Kanto No. 12 was better than that of No. 2 or No. 14. It is concluded that the safe storage period for canning peaches is 2–3 weeks.

293. McClure, T. T., and Smith, W. L., Jr.
Postharvest decay of peaches as affected by temperatures after hydrocooling in water or Dowicide A solutions.
Phytopathology, 1959, **49**: 472-4, bibl. 5.

Peaches inoculated with *Monilia fructicola* or *Rhizopus stolonifer* were hydrocooled in water or in a 0·1% Dowicide A solution, held 3 days at 40°, 45°, 55°, or 60° F., and finally kept at 75° F. for 3 or 6 days. The percentages of brown rot and *Rhizopus* rot after 3 days at 75° were less in peaches previously held at 40° than in peaches held at 60°. After 6 days at 75° *Rhizopus* rot was still somewhat less in peaches previously held at 40° than in peaches previously held at higher temperatures. The percentage of brown rot at this time was about the same, regardless of previous holding temperatures. Dowicide A reduced both rots, but was much less effective when the holding temperature was 60° than when it was 55° or lower. [From authors' summary.]—Plant Industry Stat., Beltsville, Md.

294. Couey, H. M., and Harvey, J. M.
Ionizing radiation: problems in its application to decay control in fresh figs and other perishables.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 17-19, bibl. 2.

Post-harvest decay in fresh figs was delayed by irradiation in pasteurization doses. At a level of 4 × 10^5 rads, the incipient decay in packages stored for 7 days at 33° F. and for a further 2 days at 70° F. was reduced from about 80 to 50%, and severe decay from about 40 to 2%, with only slight radiation damage.

Drying and processing.

295. Eddy, C. W., and Shafiq, M.
Continued experiments on drying of apricots in the Gilgit territory.
Punjab Fruit J., 1958/1959, **22**(78): 18-24, bibl. 2, illus.

Methods for producing sulphured, sun-dried apricots, and suggested grade standards. [For earlier work see *H.A.*, 29: 152.]

296. Anet, E. F. L. J., Reynolds, T. M., and Ingles, D. L.
Chemistry of non-enzymic browning. I. Reactions between amino acids, organic acids, and sugars in freeze-dried apricots and peaches. II. Some crystalline amino acid-deoxy-sugars. III. Effect of bisulphite, phosphate, and malate on the reaction of glycine and glucose. IV. Determination of amino acids and amino acid-deoxyfructoses in browned freeze-dried apricots. V. The preparation of aldose-potassium bisulphite addition compounds and some amine derivatives. VI. The reaction of aldoses with amine bisulphites. VII. Crystalline di-D-fructose-glycine and some related compounds. VIII. The hydrolytic reactions of aldose bisulphite addition compounds.
Reprinted from *Aust. J. Chem.*, 1957, **10**: 182-92, 193-7; 1959, **12**: 265-74; 1958, **11**: 575-80; 1959, **12**: 97-101, 275-9, 280-7, 288-95; bibls.

297. Moreau, M.
Études sur la moisissure verte des prunes d'Ente. L'*Aspergillus mangini:* ses exigences nutritives, ses conditions de développement. **(Studies on green mould of d'Ente prunes. *Aspergillus mangini* its nutritional requirements and conditions for growth.)**
Fruits d'Outre Mer, 1959, **14**: 315-28, bibl. 11, illus.

To prevent the spread of *A. mangini* in prunes, cold storage is recommended at an R.H. value as low as is consistent with preventing excessive dehydration of the prunes.

298. Sordoillet, R.
L'industrie des fruits confits d'Apt. **(The glacé fruits industry of Apt.)**
Fruits d'Outre Mer, 1959, **14**: 171-5.

Napoleon cherries form 80% of the raw material. The trees are treated with sprays containing DDT as soon as warnings of the presence of cherry flies (*Rhagoletis cerasi*) are received. The fruit is stored in sulphur dioxide and is finally preserved by saturation with equal parts of sugar and glucose, different colouring matters being used according to the export destination.

SMALL FRUITS, VINES AND NUTS.

Strawberries.

(*See also* 11, 65, 135, 191, 315, 437, 531, 533, 545, 573, 592, 1478.)

299. Raphael, T. D.
New strawberries.
Tasm. J. Agric., 1959, **30**: 113-14.

The characteristics of Talisman, Cambridge Vigour and Royal Sovereign M.401, as observed at the Summerleas Horticultural Station, are described. The colour of the fruit of Talisman appears to be different in Tasmania from that reported elsewhere.

300. Thiele, K. P.
Erdbeerhochzuchtsorte Direktor Paul Wallbaum. **(The strawberry variety Direktor Paul Wallbaum.)**
Rhein. MSchr. Obstb., 1959, **47**: 139, from abstr. in *Beerenobstschriftt.* 1959, No. 15, p. 10.

A cross between Frau Mieze Schindler and Georg Soltwedel.

301. THORSRUD, J.
Utvalg av kloner i jordbaersorten Abundance. **(The selection of clones within the strawberry variety Abundance.)**
Frukt og Baer, 1958, **11**: 42-5, bibl. 2.

There were great differences in winter hardiness among the clones, resulting in differences in yield.

302. TELLERINI, G.
Aspetti ed esigenze della coltura del fragolone. **(Aspects and requirements of strawberry growing.)**
Progr. agric., 1959, **5**: 747-50, illus.

Concerns the Imola district of Romagna, and deterioration of the variety Madame Moutot.

303. CHELLAPPA, T.
The physiology of strawberry seed germination.
Diss. Abstr., 1959, **20**: 859-60, being *L.C. Card No. Mic.* 59-2993 of 62 pp.

The highest germination percentage of strawberry seeds was obtained with seeds collected from the part of the berry with the largest diameter. Seeds from the distal portion of the berry, which always had the smallest diameter, gave the poorest germination. Seed dormancy was partially broken in Blakemore and Premier by 0·25 mg. of "Gibrel" [GA] and in Armore by 0·10 mg. "Gibrel" applied immediately after sowing. Percentage germination was significantly increased by submitting the seeds to alternating temperatures, viz. 30° C. for 6 hours during the day and 20° C. for 18 hours at night, compared with a constant temperature of 25° C. The effect of an interaction between temperature and the rate of "Gibrel" application on seed germination was significant only with the Blakemore variety. Mechanical scarification, by filing the seeds of Blakemore, did not significantly increase the germination percentage unless "Gibrel" (0·1 or 0·25 mg.) was added. The highest germination (69·7% at the end of 28 days) was obtained with Blakemore seeds scarified for 20 min. with sulphuric acid, and germinated at alternating temperatures immediately after treatment with 0·25 mg. "Gibrel".—Kans. St. Univ.

304. PESSERL, G.
Ist die intensive 1- oder 2-jährige Erdbeerkultur auch in rauheren Lagen möglich und zweckmässig? **(Is the intensive culture of strawberries for one or two years possible and advantageous in a more severe climate?)**
ErwObstb., 1959, **1**: 75-8, bibl. 7.

Experiments show that the short-term culture of strawberries is possible in a climate which is more severe than that of southern or western Germany, provided planting is carried out not later than the first week in August. The need is discussed for a special plantation which yields first-class runner plants at an early date. A suitable crop to precede the strawberries in the year of planting remains to be found.

305. ANON.
Plantafstand bij aardbeien. **(Plant spacing of strawberries.)**
Reprinted from *Jversl. Proefbedrijf Noorderkempen, 1957-1958*, in *Cult. Hand.*, 1959, **25**: 301-2.

The best spacing for matted row culture of Jucunda was 0·80–0·90 m. between the rows and 0·25 m. between the plants. Mowing the leaves after fruiting is not recommended unless the plants are infested with strawberry mite. For Oberschlesien the recommended planting distance is 0·80–1 m. between the rows and 0·25–0·30 m. in the rows.

306. BRIGHTWELL, W. T., AND WOODARD, O.
The effects of variety, time of planting, and soil treatment on strawberry yields.
Mimeo. Ser. Ga agric. Exp. Stats 67, 1959, pp. 7.

Results are given from one trial of 12 varieties and another of 14, of which 8 varieties were common to both. Under conditions in Georgia, September planting gave the best results when irrigation was available, but in the absence of irrigation better stands were obtained from October and November planting. On plots where the soil was both fumigated and irrigated, a 4–8–8 fertilizer gave better yields at 2,500 lb./acre than at half this rate, but on fumigated plots without irrigation the lower rate gave the higher yield.

307. BOULD, C.
Manurial experiments with fruit: II. A factorial NPK experiment with strawberry, var. Royal Sovereign.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 82-7, bibl. 3.

It is concluded that a virus-free stock of strawberry plants can produce good yields of fruit for 3 cropping seasons in a soil relatively low in available P, and with low rates of N fertilizer, provided that the K supply available from soil or fertilizer is adequate, and pest and disease control is good. The results clearly showed that for the correct interpretation of the results of a manurial experiment it is essential to know the nutritional status of the crop, and that leaf analysis is a reliable guide to this. [For previous parts, see *H.A.*, 24: 3555 and 28: 194.]

308. BLASSINSKY, J.
Erdbeerkultur mit schwarzer Folie. **(Strawberry culture with black soil covering.)**
ErwObstb., 1959, **1**: 78-9, bibl. 1.

Prior to planting strawberries on 30 August, 1957, some of the plots were covered with black plastic film, the plants being inserted through slits in the film. In 1958 the treatment increased yields by

57·5%, and the proportion of grade-A fruit was also raised considerably. Furthermore, the date of the first harvest was two days earlier than on the control plots. The effect of the mulch on strawberries in their second and third years has not yet been tested.—Obst- u. GartenbStelle Oberfranken, Bamberg.

309. SCHALK, A.
Vervroeging van stookaardbeien met kunstlicht. **(Forcing strawberries by artificial light.)** [English summary 12 lines.]
Meded. Dir. Tuinb., 1959, **22**: 375-7, bibl. 2, illus.

Boxed strawberry plants (Deutsch Evern) were successfully forced in a heated greenhouse by ordinary incandescent lamps (300 w.). Extra light was given from early January and picking started on 29 March.—R.T.C., Kesteren.

310. YATSU, L., AND BOYNTON, D.
Pipecolic acid in leaves of strawberry plant as influenced by treatments affecting growth.
Science, 1959, **130**: 864-5, bibl. 4.

Growth inhibition due to maleic hydrazide spray or to an unsatisfied chilling requirement caused young fully expanded leaves of the strawberry to accumulate pipecolic acid to a very striking degree. It is postulated that the accumulation resulted from blockage in normal metabolic conversion to other intermediary nitrogenous compounds. [Authors' abstract.]—Cornell Univ., Ithaca, N.Y.

311. HRISTOV, L.
Studies on the initiation and development of flower buds in some strawberry varieties. [Bulgarian, with English and Russian summaries.]
Nauč. Trud. nauč.-izsled. Inst. Ovošč. Sofija, 1958, **1**: 7-29, bibl., illus., from *Ref. Bjull. bolg. nauč. Lit. (Sel'sk. lesn. Hoz.)*, 1959, **4**, Abstr. 88.

As a result of observations on 6 varieties the process of flower bud induction and development is divided into 7 phases, beginning between August 25 and September 25 and ending, in late varieties, in December.

312. GUTTRIDGE, C. G.
Evidence for a flower inhibitor and vegetative growth promoter in the strawberry.
Ann. Bot. Lond., 1959, **23**: 351-60, bibl. 15.

Experiments with pairs of strawberry runner plants joined by the stolon and acting as donor/receptor units are reported. Long photoperiods or a light-break treatment on donor plants brought about increased petiole length, increased leaf size, and delayed flower initiation in receptor plants themselves in short photoperiods. The response of receptor plants was increased by exposing donor plants to illumination by full daylight 3 hours earlier each morning than receptor plants. It is thought that this earlier illumination increased translocation from the earlier to the later illuminated plants. In translocation experiments, radioactive P^{32} moved more freely from the older to the younger plant of each pair, except when the older plants were partially defoliated or when the younger plants were exposed to full light for a longer period of time each day than the older attached plants. The results are discussed, and it is concluded that they are good evidence for the existence of a growth-regulating substance(s) which promotes vegetative growth and inhibits flower initiation. It seems possible that the regulation of vegetative growth and the control of flower induction is principally achieved in the strawberry by a flower inhibiting, vegetative growth-promoting system. [Author's abstract. See also *H.A.*, 18: 910 and 26: 3430.]—Scot. hort. Res. Inst., Mylnefield, Invergowrie.

313. THOMPSON, P. A., AND GUTTRIDGE, C. G.
Effect of gibberellic acid on the initiation of flowers and runners in the strawberry.
Nature, 1959, **184**(4688): B.A. 72-3, bibl. 4, illus.

Gibberellic acid at 100, 50, 25, 12·5 and 0 p.p.m. was sprayed on Talisman strawberries growing in pots in a glasshouse under natural short-day conditions from Sept. 4 until Nov. 19. Applications were first made at weekly, and later at fortnightly, intervals. Increasing doses caused increases in length and upright growth of the petioles, initiation of runners instead of branch crowns, and suppression of flower initiation. It is suggested that GA served as a substitute for a growth-promoting hormone produced naturally under long-day conditions, but the fact that the full effect of GA included abnormal stem elongation indicates that the long-day, growth-promoting hormone and GA are not identical.

314. HOCKEY, K. C.
Runner development of Redgauntlet strawberry plants stimulated by cool storage.
N.Z. J. Agric., 1959, **99**: 104.

Plants which had been lifted, cleaned, the large leaves removed, and kept at 38° F. in the dark for 90 days from May 9, produced over 80% more runner plants, and started runner production a month earlier, than the untreated controls.—Massey agric. Coll., Palmerston North.

Other small fruits.

(*See also* 65, 135, 191, 376, 389, 545, 573, 1478.)

315. ROELOFSEN, B.
De Proeftuin voor klein fruit te Kapelle-Biezelinge. **(The Experimental Garden for small fruits at Kapelle-Biezelinge.)** [English summary ½ p.]
Jversl. Proefst. Fruit. Wilhelminadorp, 1958, pp. 23-6, illus.

The strawberry variety Oranda, grown under Dutch lights, produced 3 kg. per light but ripened later than Deutsch Evern which produced 1·8 kg. per light. Siletz again gave the highest yields in a field trial of 12 varieties. Yields per plant from 2-year-old Jonkheer van Tets and Fay's Prolific red currants were increased by growing them on wires as a hedge rather than as bushes; the vitamin C content of Jonkheer van Tets fruits was 25% higher from hedge-trained plants. In spacing trials with black currants yields from Baldwin Hilltop were 61 kg./are at 2 × 1·5 m., and 98 kg./are at 2 × 1 m. With raspberries yields from Malling Promise and Malling Exploit were 50–60% higher with 8 canes than with 4 canes per metre of row.

316. Loginyčeva, A. G.
Self-fertility and cross-pollinating ability in certain varieties of black currant, gooseberry and raspberry. [Russian.]
Agrobiologija, 1958, No. 6, pp. 125-6.

From pollination trials it is concluded that the productivity of black currants and of some varieties of gooseberry and raspberry can be improved by interplanting selected pollinator varieties.

317. Marro, M.
La coltura del ribes nero. (**Growing black currants.**) [French summary ⅔ p.]
Frutticoltura, 1959, **21**: 463-72, bibl. 6, illus.

A comparatively new crop for Italy.

318. Piva, V.
Il ribes nero. (**Black currants.**)
Progr. agric., 1959, **5**: 921-5, illus.

Varieties and cultivation in Italy.

319. Statens Forsøgsvirksomhed i Plantekultur.
Sortsforsøg med solbaer. (**Black currant variety trials.**)
Erhvervsfrugtavl., 1959, **25**: 309-12.

English varieties prominent among those recommended for Denmark.

320. Larsson, G.
Norrländska sortförsök med svarta vinbär 1944-1958. (**Black currant variety trials in Norrland.**) [English and Esperanto summaries 1½ pp. each.]
Medd. Trädgårdsförs. Alnarp **122**, 1959, pp. 30, bibl. 11, illus.

Trials in northern Sweden showed that English and Dutch black currant varieties grew and yielded successfully in favoured localities. Eleven local varieties, early, mid-season and late, are recommended for Swedish conditions.

321. Indenko, I. F.
Foliar nutrition of black currants. [Russian.]
Sad i Ogorod, 1959, No. 5, pp. 54-6.

Soil and foliar applications of nutrients proved equally effective, but the latter were easier to apply and could be combined with some plant protective sprays. Of 6 foliar sprays tested, 2% superphosphate + 0·5% urea has given the best results, increasing the yields over a 3-year period by 18%.

322. Wilson, D.
Prediction of harvest date for black currants.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 78-81, bibl. 2.

A high correlation between date of first flower and harvest date for 7 black currant varieties over periods of up to 11 years suggests that flowering date can be used as a basis for the prediction of harvest date. It is shown that forecasts based on the mean number of days between flowering and harvest date would have been accurate to within ± 3 days in 36 instances out of 54. While the method will probably be applicable in areas other than at Long Ashton, environmental differences will make it necessary to base calculations on local data. [From author's summary.]

323. Gleisberg, W., and Aumann, H.
Die Flavonole der Schwarzen Johannisbeere. I. Der Gehalt der Beeren an Flavonolen. (**The flavonols of the black currant. I. The flavonol content of the berries.**)
Gartenbauwiss., 1958, **23**: 512-31, bibl. 45, illus.

324. Žujkova, I. V.
Some growth and developmental characteristics of species of *Vaccinium* under conditions of the Hibiny mountains. [Russian.]
Bot. Žurnal, 1959, **44**: 322-32, bibl. 28, illus.

Morphological studies on *Vaccinium myrtillus*, *V. uliginosum* and *V. vitis idaea*.

325. Correll, F. E.
New blueberry varieties.
Res. and Fmg N.C., 1959, **17**(4): 13, illus.

Describing Garden Blue (NC 468) and Menditoo (NC 478).

326. Doughty, C. C.
The effect of certain growth regulators on the fruit set of cranberries (*Vaccinium macrocarpon*).
Diss. Abstr., 1959, **20**: 837-8, being *L.C. Card No. Mic.* 59-3151 of 85 pp.

Fourteen growth substances tested for increasing yields of cranberries were not effective in the year of application. When 20 p.p.m. *p*-chlorophenoxyacetic acid was applied at 45–55% full bloom and again at 80–95% full bloom, some increase in the number of flower buds initiated was noted, and in the following year yields were significantly increased. In a year of good natural set, however, no response was obtained in either blossom set or in yield the following year. Naphthoxyacetic acid, 2,4,5-TP and NAA, alone or in various combinations, induced initial increases in percentage fruit set. Yields were not increased, except with a mixture of NAA and naphthoxyacetic acid, which caused slight increases in both yield and seed number per berry. Responses in general varied with season and with the chemical applied. All concentrations of 2,4,5-T above 5 p.p.m. were phytotoxic, and all growth regulator treatments except 2,4,5-TP or NAA + naphthoxyacetic acid retarded the development of pollen grains and ovules in flower buds. In some cases the treatment increased the amount of premature pollen germination in flower buds. Combinations of 2,4,5-TP or NAA with naphthoxyacetic acid tended to increase the rate of embryo sac development in flower buds, and both combinations induced significantly higher percentages of fruit set.—St. Coll. Wash.

327. Crang, A., and Rake, B. A.
The dessert and preserving qualities of seven gooseberry varieties.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 179-80, bibl. 1.

Colour, texture and flavour ratings.

328. Heggli, M.
Sortsgransking i stikkelsbaer. **(Variety studies in gooseberries.)**
Frukt og Baer, 1958, **11**: 46-53, illus.

34 varieties discussed.

329. Schulz, F.
Frostschäden an Stachelbeerblüten in Abhängigkeit von der Geländebewegung. **(Frost injuries to the blossom of gooseberries in relation to the terrain.)**
ErwObstb., 1959, **1**: 140-1.

A table and graphs show the decrease in the yield of gooseberries resulting from frost damage. The degree of the injury was determined by the incline of the terrain, the lower lying plants suffering more severely [see also *H.A.*, 29: 1323z].—Inst. Obstb., Berlin-Dahlem.

330. Klingbeil, G. C.
Wisconsin raspberries.
Circ. Univ. Wis. Ext. Serv. **515**, revised 1958, pp. 10, illus.

Culture, pests and diseases of red, purple and black varieties.

331. Dhaliwal, T. S.
The Mysore raspberry, a new fruit for home gardens in the central-western mountainous region of Puerto Rico. [Spanish summary ⅓ p.]
J. Agric. Univ. P.R., 1959, **43**: 132-8, bibl. 2, illus.

Characters, propagation, culture, diseases, pests, picking and yield of *Rubus albescens* (syn. *R. lasiocarpus*).

332. Hudson, J. P.
Effects of environment on *Rubus idaeus* L. I. Morphology and development of the raspberry plant.
Williams, I. H.
Idem. II. Field observations on the variety Malling Promise. III. Growth and dormancy of young shoots. IV. Flower initiation and development of the inflorescence.
J. hort. Sci., 1959, **34**: 163-9, bibl. 10, illus.; 170-5, illus.; 210-18, bibl. 9, illus.; 219-28, bibl. 7, illus.

I. The main morphological features of the raspberry plant are described, and a number of terms used for reference to the various parts are defined. Shoots arising as suckers from root buds pass through 9 distinct phases, in each of which the pattern of growth and development is different [see also *H.A.*, 29: 6].

II. A study of the growth and development in the field of root suckers of the variety Malling Promise is described. Differences in the behaviour of root suckers appearing in autumn and in spring are considered in relation to changes in climatic factors.

III. Experiments in growth rooms indicate that day-length and temperature largely determine the behaviour of emergent raspberry root suckers. Short days and cool temperatures induce dormancy in these shoots, whereas long days and higher temperatures maintain the shoot in a state of vegetative elongation. When dormancy is complete, a period of low temperature is necessary before the apical meristem readily resumes growth, although new shoots may develop from axillary buds near ground level if plants experience good growing conditions before dormancy of the original shoots has been broken. The results explain the behaviour of raspberry root suckers that appear above ground in the autumn in cool temperate climates.

IV. The present investigation of the varieties Malling Promise and Lloyd George has shown that flower initiation occurs in both varieties in the autumn after shoot elongation has ceased, except for a number of terminal buds of Lloyd George. In these, flower initiation has occurred earlier, while the shoot is still elongating, and development of the terminal inflorescence is completed in the autumn of the same year. [From authors' summaries.]—Univ. Nottingham Sch. Agric., Sutton Bonington.

333. Heslop-Harrison, Y.
Natural and induced rooting of the stem apex in *Rubus*.
Ann. Bot. Lond., 1959, **23**: 307-18, bibl. 10, illus.

Artificial darkening of the terminal 25 cm. of stems of *R. ulmifolius* in mid-summer induced rooting within 3 weeks and the formation of a dormant bud within 4 weeks.—Queen's Univ., Belfast.

Vines—general.

(*See also* 546-548.)

334. LA HULPE.
Station Provinciale de Recherches Scientifiques Agricoles et Viticoles, La Hulpe. Rapport No. 11. Essais effectués en 1958. **(La Hulpe Viticultural Research Station, Annual Report for 1958)**, 1959, pp. 35.

Vine research was carried out on the following, among other, subjects: Breeding, pollination, seed extraction, responses to 2,3,5-triiodobenzoic acid and gibberellic acid, the root systems of old glasshouse vines, soil salinity, the biology of red spider mites in glasshouses, and *Armillaria mellea.*

335. C.S.I.R.O., AUSTRALIA.
Irrigation.
A.R. C.S.I.R.O., 1957-58, 1958, pp. 35-8.

Merbein. A very similar forecast of the sultana crop resulted from examination of buds at positions 4, 9 and 14 and from examination of all 14 buds. Bud fruitfulness was closely related to hours of bright sunshine, and was reduced by covering the buds with aluminium foil from 24 October to 27 November. "Cutting out" of sultana canes during maturation of the grapes had no ill effects on bud burst, yield or fruit maturity in the following season. Single buds, taken from unpruned vines after dormancy had broken, all burst on the same date when kept at 20° C. With low N applications in the spring there were increases of 37% in number of bunches, 26% in weight of fresh fruit and 6·5 cwt. per acre of dried fruit compared with high N applications in the spring. There was a significant increase in the moisture content of sultana buds at the change from organic to induced dormancy. Soil fumigation trials with Nemagon, Vapam and EDB gave better tomato yields as dosages of the fumigant increased. *Griffith.* Superphosphate application improved citrus fruit quality in a no-tillage plot, and improved yields in grass sod; increasing N levels caused a decline in fruit quality. Severe chlorosis in stone fruits was best controlled by trunk injection with ferric citrate, and mild chlorosis by a foliar spray of an iron chelate. Leaf samples from peaches and apricots showed that K levels were reduced with increasing water-logging damage; P reached an abnormally high level in damaged trees. Apricots were less able to accumulate an adequate level of K in the leaves when on plum stock than when on apricot stock. *Aonidiella aurantii* on freshly picked Washington Navels was completely controlled by heat treatment ranging from 1 hour at 70° C. to 2¼ hours at 50° C.

336. CIAFFI, B.
Viti e vini delle Marche. **(Vines and wines of the Marche provinces.)**
Progr. agric., 1959, **5**: 1025-37, illus.

Production, varieties and training systems.

337. BONAVENTURA, G.
Una vite plurisecolare in Trastevere (Roma). **(A vine several centuries old in Trastevere, Rome.)**
Nuovo G. bot. ital., 1957, **64**: 731-4, bibl. 21, illus., [received 1959].

A huge, ancient specimen of the variety Pizzutello bianco.

338. ETCHELLS, J. L., BELL, T. A., AND WILLIAMS, C. F.
Grape leaves—the answer to pickle spoilage?
Res. and Fmg, N.C., 1959, **17**(4): 12.

Leaves of the vine variety Scuppernong have been found to contain a high concentration of an inhibitor of the enzymes which cause softening in pickled cucumbers.

Vines—breeding and varieties.

339. BLAHA, J.
Otázka jakosti v klonové selekci révy vinné. **(The question of quality in the selection of grape vine clones.)** [English, French, Russian and German summaries ¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 697-704, bibl. 5.

A new method for obtaining a numerical value for quality is suggested for use in the comparison of new varieties and clones of vines. This figure can be combined with that for yield to give a more accurate evaluation. A new method for assessing the acidity of the grapes is also outlined.

340. POSPÍŠILOVÁ, D.
Výsledky prvých krížení viniča na Výskumnom ústave pre vinohradníctvo a vinárstvo v Bratislave. **(Results of the first vine hybridizations at the Viti-vinicultural Research Institute, Bratislava.)** [French, Russian and German summaries ¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 681-96, bibl. 14, illus.

The seedlings of the hybrids produced at the Institute in 1951 and 1952 had little vigour and showed great variability. Their main characteristics are tabulated; these include type of inflorescence, characteristics of fruit, vigour, maturity of wood and frost resistance.

341. POGOSJAN, S. A.
Selection of parents for the production of wine grape varieties in the south of Armenia. [Russian.]
Agrobiologija, 1959, No. 1, pp. 91-9, bibl. 3, illus.

Requirements, methods and results of breeding.

342. Coutinho, M. P.
O comportamento de algumas videiras resistentes à *Plasmopara viticola*, perante a modificação das condições ecológicas. **(Performance of some vines resistant to *Plasmopara viticola* under changed ecological conditions.)** [English summary ½ p.]
Agron. lusit., 1955 (issued 1959), **17**: 205-14, bibl. 15, illus.

Downy-mildew-resistant Portuguese clones did not show increased susceptibility when grown in Madeira despite severe exposure to attack, and resistance was consequently considered to be a varietal character.

343. Boehm, E. W.
Wine grape varieties for new plantings.
J. Agric. S. Aust., 1959, **62**: 428-35, illus.

The main characteristics of 23 varieties are summarized, and the acreages under them in 1957 are tabulated. Sultana, Grenache, Muscat Gordo, Shiraz and Currant each account for more than 10% of the acreage, and together for more than 70%. Guidance is given on the selection of varieties, with special reference to resistance to frost, rain damage and disease.

344. U.S. Department of Agriculture.
Here are two new grapes.
Agric. Res., Wash., 1959, **7**(11): 16.

Exotic, a black vinifera table variety, is recommended for Arizona; Magoon, a black muscadine, is suitable for the Gulf States.

345. Harmon, F. N., and Weinberger, J. H.
Exotic, a new *vinifera* grape variety.
Fruit Var. hort. Dig., 1959, **13**: 56.

Medium-early, easily thinned, good quality black grape.

346. Scott, D. H., and Christ, E. G.
The Dix grape, a new juice variety.
Fruit Var. hort. Dig., 1959, **13**: 59.

See *H.A.*, 29: 3342.

347. Dalmasso, G., and others.
Nebbiolo. Grignolino. Freisa. Barbera. Dolcetto. **(The vine varieties Nebbiolo, Grignolino, Freisa, Barbera and Dolcetto.)**
Ann. Sper. agrar., 1959, **13**(3), Suppl. pp. i-xxviii, bibl. 22; pp. xxix-xli, bibl. 9; pp. xliii-lviii, bibl. 20; pp. lix-lxxiii, bibl. 23; pp. lxxv-lxxxix, bibl. 18; all illus.

All dark-skinned wine varieties.

Vines—growth and climatic factors.

348. Manzoni, I.
Origine, struttura e funzione dei vari tipi di gemme della vite. **(Origin, structure and function of the various types of buds on vines.)**
Riv. Vitic. Enol., 1959, **12**: 295-309 and 331-44, bibl. 25, illus.

349. Popescu, E.
Importanţa practică a cunoaşterii fazelor de vegetaţie la viţă de vie. **(Practical importance of knowing the vegetative stages in the grapevine.)** [English, French, Russian and German summaries 1 p. each.]
Grăd. Via Liv., 1959, **8**(4): 18-22.

Description of stages in the growth cycle of vines in Roumania.

350. Poenaru, I., and Lăzărescu, V.
Importanţa practică a cunoaşterii fazei dezmuguritului la soiurile de viţă de vie. **(Practical importance of knowing the blossoming period of grapevine varieties.)** [English, French, Russian and German summaries 1 p. each.]
Grăd. Via Liv., 1959, **8**(3): 23-8.

Observations over 4 years have shown that vine varieties can be classified on the basis of the sum of the air temperatures above 5° C. required between the time when the soil at 30–40 cm. depth attains 5° C. and the onset of blossoming. Four groups are distinguished in which this sum is 300–320°, 320–360°, 360–380°, and above 380° C., respectively.

351. Cejtlin, M. G., and Anikeeva, S. P.
The overwintering of vine buds. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(5): 32-5, illus.

The overwintering of uncovered vines and of those under 3 kinds of cover was studied in Uzbekistan for 3 seasons. After mild or moderately severe winters (minimum air temperature −16° C.) fewer blind buds and more fruiting shoots were produced by uncovered plants than by those carefully covered with a 15–30-cm. layer of soil. A lighter cover of clods of earth or haulms was satisfactory even with widely fluctuating temperatures (from −16·8 to +26·6° C.), and is generally recommended. When the shoots and the ground were sprayed with 0·02% Granozan [a fungicide of unspecified composition] before covering with a thick layer of soil, fewer microorganisms were found on the buds, which developed better than those of the controls.

352. Bogun, S. S., and Fedoseev, A. P.
Climatic conditions in the spring and methods of preventing frost damage to vines in the foothills of Zaili Ala-Tau. [Russian.]
Tr. Kazahsk. n.-i. gidrometeorolog. In-ta, 1957, No. 8, pp. 57-63, from *Ref. Ž.* (*Biol.*), 1958, No. 12, Abstr. 53,834.

The date of uncovering vines can show an annual variation of 20–30 days depending on weather conditions. Vines are usually uncovered when the mean temperature is expected to remain above 5° C. The probability of a drop to −8° C. after bud burst does not exceed once in 10 years. To prevent frost damage, bud burst should be retarded by deep planting and by measures which delay the warming up of the soil, such as heavy irrigation in the spring [see *H.A.*, 27: 3258]. Even when bud burst is retarded, the total sum of active temperatures during the growing season still remains sufficient to bring the crop to maturity, i.e. 2,900–3,350 degrees C.

353. Primault, B.
Kann roher Müllkompost als Frostschutzmittel dienen? **(Can crude compost from town refuse be used for frost protection?)**
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 486-91, bibl. 2.

For various reasons it was not possible to utilize the heat generated by the decomposition of crude compost from town refuse for the protection of vines against spring frost. The spreading of a thin layer of compost, however, provided good heat insulation which resulted in a more uniform temperature in the underlying soil.

354. Falcomer, G., and Ceresatto, R.
Considerazioni sui danni alla vite per gelate tardive nella zona del Piave. **(Observations on injury to vines by late frosts in the Piave area.)**
Progr. agric., 1959, **5**: 914-16, illus.

The varieties Merlot and Trebbiano were more resistant to spring frost injury than Raboso types, and most of the direct-producer hybrids showed good resistance. Treatment of damaged vines consisted chiefly in pruning back to latent buds, and losses in yield were least where the whole of each damaged shoot was removed, thus inducing good growth from substitution buds.

Vines—nutrition and irrigation.

(*See also* 35.)

355. Larsen, R. P., and others.
Effects of nitrogen, phosphorus, potassium and magnesium fertilizers on yield and petiole nutrient content of a Concord grape vineyard.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 812-19, bibl. 26.

The conclusions drawn from this 5-year fertilizer trial with Concord grapes are that higher yields could be maintained in Michigan with less N than is normally applied, that P and Mg are not required, that annual applications of K are not needed and that when applied the sulphate is of equal value to the chloride, and that excess of K induces Mg deficiency.

356. Stoev, K. D., Mamarov, P. T., and Benčev, I. B.
The effect of fertilizers on the composition of rising sap in vines. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **125**: 1367-70, bibl. 18, illus.

N, P and K applied when the sap was beginning to rise in the vine increased the content of sugars and the number of amino acids present on the second day after application, but had no influence on sap composition 10 and 44 days after treatment.

357. Gerber, H., Peyer, E., and Naef, J.
Blattbespritzung gegen Kalimangel bei Reben der Sorte "Blauer Burgunder" in der Bündner Herrschaft. **(Foliar spraying of the vine variety Blue Burgundy against potassium deficiency in the Bünden area.)**
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 463-6, bibl. 12.

In the Bünden area vines show persistent symptoms of K deficiency, which are described. Neither foliar nutrition nor the application of K fertilizers to the soil surface produced immediate relief from the trouble. The use of a fertilizer lance might provide the answer. Data on leaf composition (P, N, K, Ca, Mg and K : Mg) are tabulated.

358. Brodnik-Specogna, T.
Degeneracija vinove loze na području Izole. **(Degeneration of grape vines in the Izola district. (Preliminary communication.).)** [German summary $\frac{3}{4}$ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 127-34, bibl. 5, illus.

This form of degeneration in vines has been traced to K and B deficiencies.

359. Gärtel, W.
Ergebnisse eines vierjährigen Düngungsversuches mit Spurenelementen im Weinbau. **(Results obtained in a 4-year manurial trial on the application of trace elements in viticulture.)**
Reprinted from *Weinberg u. Keller*, 1959, **6**: 203-10, bibl. 6.

A highly significant increase in yields, viz. 49–80 g. per vine, was obtained as a result of trace element and Mg applications. Fruit quality remained unaffected. The general use of B, Zn and Mn in viticulture is advocated. Tables and graphs present the data in detail.—Inst. Rebenkrankh., Bernkastel-Kues/Mosel.

360. Kolesnik, L. V.
The effect of aluminium on vine grafts [Russian.]
Sadov. Vinograd. i Vinodel. Moldavii, 1957, No. 1, pp. 37-9, from *Ref. Ž.* (*Biol.*), 1958, No. 13, Abstr. 58,768.

On the basis of trials conducted on the optimum rates of Al application it is recommended that the nutrient should be used at 10 mg. per kg. air-dried soil in the stratification boxes and at 1–2 kg. per ha. in the nursery. The highest output of first quality transplants from the nursery resulted from 1 or 2 top dressings.

361. **Dobroljubskij, O. K.**
Changes in the biochemical processes of vine caused by a chromium-containing micro-fertilizer. [Russian, with English summary 7 lines.]
Biohimija, 1959, **24**: 625-30, bibl. 15.

Chromium sulphate at 0·005 and 0·2 g. per plant was sprayed on the vine variety Aligote during lowering. The treatment was followed by changes n the redox potential, redox index and pH and y an increase in the activity of catalase, ascorbinxidase, polyphenoloxidase, peroxidase and inverase. The content of chlorophyll increased in the eaves and that of organic acids in both leaves and erries. The content of sugars changed, glucose nd particularly fructose increasing in the berries. These biochemical effects resulted in increased yields, higher sugar contents, reduced acidity and arlier ripening.

362. **Nicolussi-Leck, C.**
L'irrigazione a pioggia, fattore di qualità nei vigneti. **(Sprinkler irrigation, a factor affecting quality in grapes.)**
Progr. agric., 1959, **5**: 1019-24, illus.

n northern Italy sprinkler irrigation in vineyards as increased the sugar content, as well as the yield, of grapes, and has markedly improved the uality of wines.

Vines—training and pruning.

363. **LaVine, P. D.**
Grapes. Stakes set with water.
Amer. Fruit Gr, 1959, **79**(11): 19-20, illus.

An apparatus is described by which a water jet s used to drill holes for trellising stakes. The water jet is not effective in rocky or heavy clay oils, but on sandy or loam soils it is the quickest method of setting stakes. It may also be used to lant rooted vine cuttings.

364. **Spurling, M. B.**
Training and trellising grapevines.
J. Agric. S. Aust., 1959, **62**: 352-6, illus.

Rooted cuttings are recommended in preference o unrooted cuttings for the establishment of vineards. They should be cut back to a two-bud pur in the first winter after planting. Planting ows are usually 12 ft. apart and plants are spaced rom 4 ft. 6 in. to 12 ft. apart in the rows, depending n variety. The methods of trellising described nd illustrated are the two-wire for most spurruned varieties and for the less vigorous rodruned varieties, the single-wire for Muscat Gordo, he three-wire for Zante currants, T-trellises of arious types for rod-pruned varieties including ultanas, and fully overhead trellises for Ohanez able grapes.

365. **Fleming, H. K.**
Age of vine and Concord grape production.
Bull. Pa agric. Exp. Stat. **648**, 1959, pp. 14, bibl. 8, illus.

A replicated experiment was initiated in an old Concord vineyard in 1947, and was continued for 10 years. Several methods for renewing the above- and below-ground organs of bearing vines, with and without subsoiling, were compared. Where trunks were sound, cutting back the tops to a height of 1 ft. induced usable sucker development in 14% more vines than in the controls. Wounding, heavy pruning or root pruning, however, had no effect. Subsoiling definitely reduced yields for the 3 subsequent years, and heavy pruning lowered yields in 8 of the 10 years. The age of the vine did not affect its yield, and it is concluded that the improvement of the physical and chemical properties of the soil is a more important factor in vineyard renovation than is renovation of the vines by pruning.

366. **Bradt, O. A.**
A comparison of the Umbrella and Kniffen systems of pruning grapes.
Bienn. Rep. hort. Exp. Stat. Prod. Lab., Vineland, for 1957 and 1958, pp. 15-17, illus.

Ten of the twelve varieties tested produced higher yields after pruning by the 6-cane Kniffen system than by the Umbrella Kniffen method. Selection of fruiting canes and their tying-in was easier with the 6-cane system. There was no yield difference with Delaware between the pruning methods, but Seneca produced more after pruning by the Umbrella Kniffen system.

367. **Beattie, J. M.**
Severe pruning reduces yield and quality of Concord grapes.
Ohio Fm Home Res., 1959, **44**: 4-5, illus.

As a result of a 3-year trial of 5 levels of pruning, moderate pruning is recommended for Concord vines. This should consist of leaving 30 buds for the first pound of 1-year-old wood removed, and 10 buds for each additional pound.

368. **Oprea, D. D.**
Tăierea aplicată soiului Riesling italian in conditile pedo-climatice din silvostepă. **(Pruning the Italian Riesling grape-vine under the pedoclimatic conditions of the zone between forest and steppe.)** [English, French, Russian and German summaries ¾ p. each.]
Grăd. Via Liv., 1959, **8**(3): 28-31.

Of 3 methods of pruning tested at the N. Bălcescu Agricultural College, Bucharest, long pruning, i.e. leaving 4 canes with 15 buds each, resulted in the highest yields. Long pruning provided yields of 16,218–17,488 kg./ha., as against 11,769 kg./ha. for mixed pruning (i.e. thinning and spurring), and 8,366–8,586 kg./ha. for spur pruning.

369. Filippenko, I. M.
Repeated topping of shoots in northern viticulture. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(5): 28-31, bibl. 1.

Experiments with 5 vine varieties grown as espaliers have shown that, where vegetative growth is too vigorous, 4 toppings during the season can improve the earliness, size and quality of the fruit, the maturity of the wood and the percentage of fruiting buds in the following year. The first topping was carried out when the shoots reached the 3rd wire, or were 1·1–1·2 m. high, and subsequent new growth was pinched back to 5–6 cm.

370. Malan, A. H.
The topping and removal of lateral shoots and shortening of flower clusters in table grapes.
Dec. Fruit Gr, 1959, **9**: 217-19, illus.

From trials conducted on a number of vine varieties, recommendations for topping and shortening shoots and bunches are presented in tabulated form. For maximum density of bunches, all shoot growth should be stopped from the beginning of the flowering stage until after the setting of the berries.—West. Province Fruit Res. Stat., Stellenbosch.

371. Tavadze, P. G.
Establishing the optimum ratio between leaf area and root system in vines. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(5): 26-8, bibl. 2.

Increasing the leaf area : root volume ratio, e.g. by root pruning, was beneficial on a fertile, irrigated soil, but caused a reduction in both yield and quality on a poor dry soil.

Vines—pollination and fruit set.

372. Singh, S. N.
Germination of pollen grains of *Vitis vinifera*.
Curr. Sci., 1959, **28**: 258, bibl. 2.

A 25% sucrose solution gave the highest pollen germination (70%) and the maximum pollen tube length in 6 hours (492 μ).

373. Loladze, V. R.
Incidence of fruit set under conditions of isolation in functionally female varieties of vine. [Russian.]
Agrobiologija, 1959, No. 3, pp. 465-7.

In tests on 5 vine varieties with functionally female flowers, the inflorescences were wrapped in parchment or the flowers were emasculated. Two varieties produced no fruit, 2 produced a range of fruit from parthenocarpic to normal with normally developed seeds, and one produced only a few small fruits.

Vines—harvesting, storage and composition of grapes.

(*See also* 101, 361.)

374. Capt, E.
Quelques particularités de la maturation du raisin en 1959. (**Some information on the ripening of grapes in 1959.**)
Rev. romande Agric. Vitic., 1959, **15**: 94-6.

Variations in the composition of grapes, and more particularly of must, and in the fruit maturity index are recorded for sampling dates ranging from mid-August to early October, and are compared with corresponding data averaged for the preceding 30 years.

375. Huglin, P., and Julliard, B.
Le contrôle de la maturation du raisin par le prélèvement de baies. (**Estimating grape maturity by berry sampling.**)
Progr. agric. vitic., 1959, **152**: 11-16, 37-41, bibl. 3, illus.

The authors discuss first the methods and results of Benvegnin and Capt [see *H.A.*, 25: 2559]. The authors' method of sampling for maturity is similar, namely, to select single berries at random, collecting 200 berries per sample.—Stat. Rech. vitic. œnol. Alsace (I.N.R.A.).

376. Koch, J., Freter, H., and Sajak, E.
Occurrence of "soluble" proteins in fruit juices. [German?]
Z. LebensmittUntersuch., 1959, **109**: 395-9, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-177.

In grapes maximum quantities of "soluble" proteins appear before harvest, decreasing as the grapes remain unharvested; in apples and pears at the ripe-picking stage there is only a small quantity; in stone fruits the protein content of the juice increases during storage, then decreases. The amount present depends on the ripeness and variety of the fruit, the locality and the rootstock. Grape harvesting for wine preparation may be carried out before, during, or after maximum protein formation, a condition which affects the cloudiness of the must or wine. Ripe black currant juice contains no protein.

377. Pešakov, G., and Pantaleev, P.
Studies on the epiphytic microflora of vines in relation to the storage of grapes. [Bulgarian.]
Lozarstvo i Vinarstvo, 1958, **7**(5): 21-4, from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 133.

Changes in the microflora during the development of vines are noted. The amount of epiphytic microflora had an influence on the storage life of fresh grapes. Sound grapes rich in sugars and poor in acids, with a good bloom, kept the best. The varieties Bolgar and Dimjat stored best at −2° C. Grapes stored at 2° C. suffered 8–30% greater losses than those stored at −2° C. Temperatures below −2·5 to −3° C. should not be used.

378. Nelson, K. E., Maxie, E. C., and Eukel, W.
Some studies in the use of ionizing radiation to control botrytis rot in table grapes and strawberries.
Phytopathology, 1959, **49**: 475-80, bibl. 9.

The rate of spread of botrytis rot in stored grapes and strawberries was markedly reduced by radiation doses of 1 × 10^5 and 2 × 10^5 rep. Higher doses were more effective in stopping the growth of *Botrytis cinerea*, but damage to the fruit was apparent. [For earlier work see *H.A.*, 29: 271.]—Univ. Calif., Davis, and Applied Radiation Corp., Walnut Creek, Calif.

379. Dini, D.
Il valore alimentare dell'uva. **(The nutritional value of grapes.)**
Progr. agric., 1959, **5**: 1178-9.

Calorific value, amino acids, minerals, vitamins and co-enzymes.

Temperate nuts.

(*See also* 259.)

380. Crescimanno, F. G.
L'apparato radicale del mandorlo in alcuni terreni tipici della coltura in Sicilia. **(Almond root systems in some soils characteristic of Sicilian culture.)**
Tecn. agric., 1959, **11**: 3-12, bibl. 8, illus.

The diameters of the root systems of 5 almond trees, aged from 6 to 45 years and growing on upland and lowland sites in Agrigento province, all considerably exceeded those of the crowns. It is recommended that in this district cultivation and fertilization should cover an area at least twice that of the crown, cultivation should not exceed 10 cm. n depth and fertilizers should be applied to that depth. Vertical and horizontal plans of root systems are presented.—Ist. Colt. arb. Univ. Palermo.

381. Damigella, P.
Le cultivar di castagno da frutto della provincia di Catanzaro. **(The sweet chestnut varieties of Catanzaro province.)**
Tecn. agric., 1959, **11**: 125-36, bibl. 2, illus.

Brief botanical notes are given on 3 varieties, of which only one, Riggiola, is worth extensive planting.

382. le Roux, J. C.
Pecan nut industry making good progress in Natal.
Fmg S. Afr., 1959, **35**(6): 10-11, 13, illus.

Research for the expanding pecan nut industry in Natal is being carried out at Ukulinga and in experimental plots throughout the region. Progress in studies on soil requirements, and on early-bearing and scab-resistant varieties, is summarized.

383. (Hunter, L. H.)
Some liming boosts pecan yields.
Agric. Res., Wash., 1959, **8**(1): 6-7.

Experiments at Albany indicated that the development of rosette disease of pecans, caused by lime-induced zinc deficiency, can be corrected by the use of zinc sulphate for 3 years, at a total rate of 15 lb. per tree. Combined with this treatment, the use of just sufficient lime to correct excessive soil acidity increased average annual nut output 3–4-fold on the test plots.

384. Eynard, I.
La coltivazione del pistacchio nel Baluchistan iraniano. **(Growing pistachio nuts in Iranian Baluchistan.)**
Frutticoltura, 1959, **21**: 363-8, bibl. 12, illus.

Species, rootstocks and cultural practices.

385. Kemmer, E.
Über die Schwierigkeiten des Walnussanbaues in Deutschland. **(On the difficulties encountered in the growing of walnuts in Germany.)**
ErwObstb., 1959, **1**: 159-62, bibl. 2, illus.

An analysis of the present position and suggestions for its improvement.

386. Maurer, K. J.
Unterlageneinfluss und Wurzelverlauf bei der Walnuss. **(Rootstock effect and root development in walnuts.)**
Neue dtsch. Obstb., 1958, **4**: 82, from abstr. in *ErwObstb.*, 1959, **1**: 102.

A preliminary report is given on 10 years' observations of a walnut variety, which had been worked both on *Juglans regia* and on *J. nigra*. Trees on the former rootstock were much more vigorous and required a spacing of 10 × 10 m., whereas a spacing of 8 × 8 m. was sufficient for trees on *J. nigra*. Walnuts were shown to be shallow rooted, with their roots extending well beyond the perimeter of the tops. Data on yields have not yet been published.

PLANT PROTECTION OF TEMPERATE FRUITS

General.

(*See also* 330, 1460.)

387. Klos, E. J.
Tree fruit diseases in Michigan.
Ext. Bull. Mich. St. Univ. **361**, 1959, pp. 59, illus.

Their economic importance, symptoms and control.

388. Smith, C. F., and Clayton, C. N.
Peach spray information.
Ext. Circ. N.C. agric. Ext. Serv. **407**, revised 1959, pp. 15, illus.

Including a spray programme for disease and pest control.

389. (Goidànich, G.)
Avversità delle colture orticole. *Ribes.* (**Diseases and pests of horticultural crops. *Ribes.***)
Progr. agric., 1959, **5**: 926-7, illus.

Brief notes are given on control of the following currant and gooseberry parasites: yellow aphis (*Capitophorus ribis*), anthracnose (*Pseudopeziza ribis*), septoriosis (*Septoria ribis*, with its ascospore form *Mycosphaerella grossulariae*), rust (*Cronartium ribicola*), and wood-borer (*Trochilium tipuliforme*). Correction of lime-induced chlorosis by manuring is briefly described.

390. Berry-Smith, F.
Control of pests and diseases of glasshouse grapes.
N.Z. J. Agric., 1959, **98**: 577-81, illus.

The programme outlined herein for pest and disease control on grapes grown under glass involves: burning of all debris and prunings; lime sulphur and DDT spraying at the time of bud swelling; fumigation with parathion when the shoots are 4–6 in. long; dusting with flowers of sulphur when the shoots are 8 in. long, and thereafter every 2–3 weeks until the grapes start to colour; and finally azobenzene smokes or aerosols at fortnightly intervals after fruit set to control red spider mite.

Viruses.

391. Luckwill, L. C., and Campbell, A. I.
***Malus platycarpa* as an apple virus indicator.**
J. hort. Sci., 1959, **34**: 248-52, bibl. 6, illus.

Attention is drawn to the value of *Malus platycarpa* Rehd. as an indicator plant for certain apple viruses. The following types of symptom have been observed on *M. platycarpa* inoculated with buds from apple: (a) line pattern on the leaves; (b) dwarfing; (c) a scaly bark condition which is associated with fungal infection. The viruses responsible for line pattern and dwarfing in *M. platycarpa* appear to be widely distributed in latent form in commercial apple varieties, and in the Malling series of clonal rootstocks. As far as is known, they produce no harmful effects. No infection was found in the 4 Malling-Merton rootstocks tested. [Authors' summary.]—Long Ashton Res. Stat., Univ. Bristol.

392. Canova, A.
Le virosi dei fruttiferi. (**Virus diseases of fruit trees.**)
Frutticoltura, 1959, **21**: 381-9 and 473-500, illus.

In continuation of the series, the following additional peach diseases [see *H.A.*, 29: 2268] are described: blotch, wart, virus X, calico, and phony disease. Other stone-fruit hosts and insect vectors are noted. Young peach plants have been cured of phony disease by immersion, during the dormant period, in water at 48° C. for 40 minutes.
In the 5th article of the series, the following virus diseases are dealt with: Plum—line-pattern, dwarf, pox, and bark-split. Cherry—rosette, little-cherry, yellows, ring spot, tatter-leaf, leaf roll, and various leaf mottles. Apricot—mosaic, and variegation viruses transmitted from peach and cherry.—Ist. Pat. veg., Univ. Bologna.

393. Jordović, M.
O nekim malo poznatim virozama voćaka u našoj zemlji. (**Some fruit virus diseases little known in Yugoslavia.**) [English summary 4 lines.]
Zasht. Bilja, 1958, No. 47/48, pp. 109-11, illus.

Tatter leaf and ring mottle of cherry, and ring pox of apricot are described.

394. Davidson, T. R., and George, J. A.
Symptoms of sour cherry yellows and necrotic ring spot in relation to time of inoculation.
Canad. J. Plant Sci., 1959, **39**: 431-6, bibl. 6, illus.

Each month throughout the growing seasons of 1954 and 1955 two pairs of virus-free Montmorency sour cherry trees were inoculated by budding or patch grafting, one pair with cherry yellows and the other with necrotic ring spot virus. Shock symptoms induced by the two viruses were indistinguishable except that growth was retarded more severely and for longer with yellows than with ring spot. However, the type and distribution of initial symptoms varied with the time of inoculation. Four symptom patterns were distinguished, and each was associated with an inoculation period. Seasonal symptom variations also revealed that the rate of movement of the yellows virus differed from that of the ring spot virus. [Authors' abstract.]—Canada Dep. Agric., Ottawa, Ont.

95. BARKSDALE, T. H.
The green ring mottle disease of Montmorency sour cherry and its causal virus as an entity distinct from the sour cherry ring spot and yellows viruses.
Diss. Abstr., 1959, **20**: 466, being *L.C. Card No. Mic.* 59-2947 of 97 pp.

96. SCHUCH, K.
Das Ring- und Bandmosaik der Süsskirsche. **(Ring and band mosaic of sweet cherry.)** [English summary 13 lines.]
Z. PflKrankh., 1959, **66**: 395-401, bibl. 9, illus.

he leaf symptoms exhibited by various cherry otstocks and some other *Prunus* spp. are desibed. In the case of the rootstock F.12/1 the owth depression induced by the disease amounted 22·9% 26 months after inoculation. Ring and and mosaic is thought to be closely related to ng mottle found in England.

397. EVENHUIS, H. H., MULDER, D., AND PFAELTZER, H. J.
De overdracht van de rozetziekte, een virusziekte van de kers. **(Transmission of cherry rosette virus.)** [English summary ¼ p.]
Tijdschr. PlZiekt., 1959, **65**: 122-7, bibl. 7, illus.

herry rosette virus was transmitted to healthy lants by grafting or budding, but not by mechani- al transmission of sap. Healthy seedlings planted n infected soil developed primary and even econdary symptoms after one year. [See also .A., 29: 2273.]—I.P.O., Wageningen.

398. JOVIĆEVIĆ, B.
Neka zapažanja o šarki šlijive u Kosovsko-Metohiskoj oblasti. **(A contribution to the knowledge of the spread of, and some observations on, *Prunus* virus 7 in the region of Kosovo and Metohija.)** [English summary 1 p.]
Zasht. Bilja, 1958, No. 46, pp. 17-25, bibl. 14, illus.

xtensive field surveys were made in the period 953-56 on the incidence of *Prunus* virus 7 in these egions. Over 40% of the plum trees were found o be infected; no varieties were immune, but ožegača was the most susceptible and Šarica and oravka were among the least. Height and aspect f terrain and age of tree had no effect on the everity of the attack, but the symptoms were partly asked in trees infested with mites or affected by rought. The virus appears to be spread primarily y infected budwood and also by nursery seedlings. —Inst. agric. Res. Peć.

399. MAASSEN, H.
Beiträge zur Kenntnis der Erdbeerviren. **(Contributions to our knowledge of strawberry viruses.)** [English summary 1 p.]
Phytopath. Z., 1959, **36**: 317-80, bibl. pp. 4½, illus.

The disease symptoms caused by grafting strawberries on to *Fragaria vesca* could be classified into 5 different virus groups. Attempts to characterize the viruses were made according to symptomatological relationships, incubation time and the behaviour of the virus in the vector *Pentatrichopus fragaefolii*. The symptoms of these groups are described in detail. *Acyrthosiphon pelargonii* ssp. *rogersii* occurs frequently on strawberries. The degree of infestation of different varieties was determined, and the properties of this aphid as a vector for two non-persistent viruses occurring in central Germany were demonstrated. *Fragaria vesca* var. *monophylla*, *F. vesca* var. *semperflorens* cv. "Rügen" and *Duchesnea indica* were established as new test plants for strawberry viruses.—Phytopath. Inst. Martin-Luther-Univ. Halle-Wittenberg and Inst. Phytopath. Aschersleben.

400. LISTER, R. M.
Soil-borne virus in strawberries: the present position.
Comm. Gr, 1959, No. 3330, pp. 678-80, illus.

A report from the Scottish Horticultural Institute, Mylnefield. [See also *H.A.*, 29: 237.]

401. KRCZAL, H.
Untersuchungen über die Verbreitung der Erdbeerblattlaus *Passerinia fragaefolii* und das Auftreten von Erdbeervirosen in der Bundesrepublik. **(Studies on the distribution of the aphid *Passerinia fragaefolii* and on the incidence of strawberry virus diseases in the Federal [German] Republic.)** [English summary 1 p.]
Phytopath. Z., 1959, **37**: 1-20, bibl. 37, illus.

Passerinia fragaefolii, the most active vector of the main strawberry viruses, was shown to be present in the whole of the Rhine area. The strawberry plantations contained two virus diseases, which are regarded as two strains of strawberry virus 1, differing in virulence and in frequency of occurrence.—Inst. Obstkrankh., Heidelberg.

402. JHA, A., AND POSNETTE, A. F.
Transmission of a virus to strawberry plants by a nematode *(Xiphinema* sp.).
Nature, 1959, **184**: 962-3, bibl. 6.

Experiments are described which showed that the presence of added nematodes in the soil was essential to the transmission of raspberry yellow dwarf virus to healthy Cambridge Favourite strawberries.—E. Malling Res. Stat., Kent.

403. Cosmo, I., and Pieri, G.
Alcune indagini sulla degenerazione infettiva della vite. **Some investigations on infectious degeneration of vines.)**
Riv. Vitic. Enol., 1959, **12**: 311-15, bibl. 8.

Various hot water treatments had no curative effect. The disease was transmitted by seeds. Spraying the soil in June with 2,4-D or its Na salt at concentrations of 0·01% or 0·004% had little or no effect on vines in the year of treatment, but caused symptoms of degeneration and reduced vegetative vigour in the following year. No endocellular cords had developed in these plants when they were examined 18 and 20 months after soil treatment.

404. Josifović, M.
Problemi zarazne degeneracije vinove loze u Jugoslaviji. (**The problem of infectious degeneration of vines in Yugoslavia.**) [French summary ½ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 119-25, bibl. 13.

Including an outline of a comprehensive research programme.

405. Dias, H. F.
Clorose infecciosa da videira. I. Expressão sintomatológica da "virose" nos principais porta-enxertos. (**Infectious degeneration of vines. I. Symptom expression in the chief rootstocks.**) [English summary 1½ pp.]
Agron. lusit., 1955 (issued 1959), **17**: 367-75, bibl. 29, illus.

406. Corte, A., Ciferri, R., and Scaramuzzi, G.
Trasmissione della degenerazione infettiva della vite sul *Ligustrum lucidum* Ait. ed altre specie arboree. Nota preliminare. (**Transmission of infectious degeneration of vines to *Ligustrum lucidum* and other woody species. Preliminary note.**) [English summary ¼ p.]
Riv. Vitic. Enol., 1959, **12**: 239-48, bibl. 6, illus.
Corte, A., and Ciferri, R.
Trasmissioni sperimentali di degenerazione infettiva della vite. (**Experimental transmission of infectious degeneration of vines.**)
Progr. agric., 1959, **5**: 1044-7, illus.

Out of 82 woody species tested as experimental hosts for the infectious degeneration virus, only 4 developed typical symptoms when budded with infected vine material. The most susceptible species was the glossy privet (*Ligustrum lucidum*), which proved an excellent indicator plant. About half the typical symptoms appeared in Mazzard F.12/1 cherry and *Rhamnus purshiana*, and about a quarter in myrobalan seedlings.

407. Niemeyer, L., and Bode, O.
Über den Virusnachweis bei Reben. (**On the detection of viruses in vines.**)
Z. PflKrankh., 1959, **66**: 640-4, bibl. 1.

The authors failed to verify G. Ochs' results on the transmission of vine viruses to herbaceous plants. They therefore question her conclusions on the nature of infectious degeneration [see *H.A.*, 28: 2340].—Inst. Rebenkrankh., Bernkastel.

Bacteria.

408. Cinq-Mars, L., and Crête, R.
Expériences sur la répression de la brûlure bactérienne du pommier au moyen d'antibiotiques. (**Experiments on control of apple fire blight by means of antibiotics.**)
Rep. Que. Soc. Prot. Plants 1958, 1959, **40**: 122-6.

In 1955 much better results were given by 50 p.p.m. streptomycin sulphate + 2 lb. of captan per 100 gal. of water, applied 3 times, than by streptomycin sulphate alone. In 1956 100 p.p.m. streptomycin sulphate + 1 pint of glyodin in 100 gal. water gave better results than the antibiotic alone or in combination with ½ lb. of dichlone.

409. Goodman, R. N.
The dual nature of fireblight infections.
Arborist's News, 1958, **23**: 84-6, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 35,234.

Streptomycin at 50 p.p.m., applied 3 or 4 times early in the season, is an effective control measure. New evidence indicates that streptomycin sprays are very effective against blossom infections, but that twig infections are not controlled by this antibiotic.

410. Parish, T.
Fire blight. What the survey has shown.
Comm. Gr, 1959, No. 3334, pp. 910-11, illus.

A survey in Kent has shown that the spread of fire-blight of pears has been arrested by the tree-grubbing policy. Branch removal is not sufficient. Laxton Superb is the most susceptible variety, possibly because it tends to produce many secondary blossoms during the summer; removal of these secondary blossoms is recommended.

411. Crosse, J. E.
Bacterial canker of stone-fruits. IV. Investigation of a method for measuring the inoculum potential of cherry trees.
Ann. appl. Biol., 1959, **47**: 306-17, bibl. 21, illus.

The method examined consisted of shaking the leaves of trees in water and plating out the washings. The number of bacteria was found to vary appreciably between leaves and between branches, but not between trees of the same variety. A sample of 192 leaves, 8 from each of 24 branches, was considered adequate to show differences between varieties, if replicated over a period. The washing echnique is described. [For part III see *H.A.*, 27: 3268.]—E. Malling Res. Stat., Kent.

412. BRODRICK, H.
New disease of plums in the Western Cape.
Dec. Fruit Gr, 1959, **9**: 207, illus.

A black spot disease, caused by *Xanthomonas pruni*, was reported in 1958 to be causing serious damage to plums, especially Japanese varieties. Bordeaux or zinc/lime are tentatively recommended for control, with the addition of 2 fluid oz. of Polagric or Teepol per 100 gal. to minimize plant injury.

Fungi.

(*See also* 178, 286, 293, 297, 378, 389, 513, 514, 522, 1476.)

413. ROOSJE, G. S.
Het mycologisch onderzoek. (**Mycological studies.**) [English summary ¾ p.]
Jversl. Proefst. Fruit. Wilhelminadorp, 1958, pp. 36-43, illus.

Apple scab. In inoculation tests with M.II, Cyprex at 0·05–0·12% did not have sufficient curative action when applied 48 hours after inoculation, but at 0·15–0·25% its effect was more satisfactory. At 0·2%, however, Cyprex was phytotoxic to leaves and fruits of Précoce de Trévoux and Clapp's Favourite pears. AAcuram (containing cetylpyridinium-dimethyldithiocarbamate) at 0·2% reduced scab infection but was also phytotoxic to apples. *Apple mildew.* Fruit from severely-mildewed Jonathan trees showed much more russeting than fruit from slightly-affected trees. Spraying as soon as the maximum day temperature reached 20° C., rather than spraying every 8–10 days, did not give satisfactory mildew control. Sprays of 0·5% SM 55 (wettable sulphur plus captan) applied on 29–30 May tended to be most phytotoxic to trees which had not previously been treated with this particular spray. *Collar rot. Phytophthora cactorum* was isolated from Ellison's Orange. At 100 p.p.m., captan was more effective for collar rot control than copper oxychloride, Cyprex or Brestan (triphenyl-tin-acetate).

414. MILLER, P. M.
Open calyx tubes as a factor contributing to carpel discoloration and decay of apples.
Phytopathology, 1959, **49**: 520-3, bibl. 12, illus.

Species of *Fusarium*, *Botrytis*, *Alternaria* and *Aspergillus* produced discoloration when injected into normal carpels. Rupture of the calyx tissues by fast growth, which may occur when heavy rain follows a dry period, may contribute to the condition. Wagener and Red Delicious are susceptible varieties.—Conn. agric. Exp. Stat., New Haven.

415. SHARPLES, R. O.
Comparative observations on apple shoot infections of *Gloeosporium perennans* and *Nectria galligena*.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 125-7, bibl. 6, illus.

Differences in morphology of shoot infections, mycelial distribution and host response.

416. BOEREMA, G. H., AND GREMMEN, J.
Een oppervlakkige bastkanker bij appel en peer veroorzaakt door *Pezicula corticola*. (**Superficial bark canker of apple and pear trees caused by *Pezicula corticola*.**) [English summary 1¼ pp.]
Tijdschr. PlZiekt., 1959, **65**: 165-76, bibl. 25, illus.

The varieties Jonathan and Bonne Louise d'Avranches were very susceptible to infection by this fungus, while Cox was not attacked.

417. BRAUN, H., AND NIENHAUS, F.
Fortgeführte Untersuchungen über die Kragenfäule des Apfels (*Phytophthora cactorum*). (**Further studies on collar rot of apples.**) [English summary 35 lines.]
Phytopath. Z., 1959, **36**: 169-208, bibl. 24, illus.

Among conclusions reached were: (1) After a rest during the winter, oospores of *Phytophthora cactorum* began to germinate when the soil temperature had reached a mean value of 7·5° C. for a certain length of time, and the germination percentage rose to 82 within 22 days when the mean temperature of the soil had reached 13° C., the optimum being about 16° C. (2) The susceptibility of apple trees was found to be highest during the period of leaf and flower development, and the spread of the fungus through rotted areas of the bark was fastest at the time of flowering and shoot formation. (3) Methods of infection by the spraying of zoospore suspensions are described. (4) Observations in two infected orchards established the relative susceptibility of 15 apple varieties. It was confirmed that susceptibility to the disease increases with the age of the tree. (5) After the June drop up to 80% of the fruits from severely infected orchards showed phytophthora rot. (6) With the exception of M.IV and M.IX, Malling rootstocks proved fairly susceptible to inoculations, the spread of the disease in the bark being much more rapid than in any scion variety. The spread of the fungus in either rootstock or scion variety was most rapid when a vigorous rootstock was used. (7) Evidence exists for the biological specialization of *P. cactorum*. (8) An antagonism was shown to exist between soil bacteria and *P. cactorum*. Manuring with castor-bean meal (at the rate of 1,200 kg./ha.) reduced infection, presumably owing to stimulation of antagonists. (9) Double-working did not provide reliable protection against infection. [For earlier work see *H.A.*, 28: 2363 and for control 29: 2295.]—Inst. Pflanzenkrankh., Univ. Bonn.

418. Kosswig, W.
Remarques sur la biologie de l'agent de l'oïdium du pommier et sur les moyens de lutte contre ce parasite *Podosphaera leucotricha* (Ell. et Ev.) Salm. (**Observations on the biology and control of the causal organism of apple mildew.**)
Fruit belge, 1959, **27**: 113-24, bibl. 7.

A French version of *H.A.*, 29: 3414.

419. Barsnes, G., and Gjaerum, H. B.
Eplemjøldogg—og kampen mot den. (**Apple mildew and its control.**)
Frukt og Baer, 1958, **11**: 54-9, illus.

Karathane, sulphur and lime-sulphur proved satisfactory for apple mildew control, while other fungicides were less effective. Of the various spraying dates tested, the earliest, i.e. just after bud burst, was the most successful. The experiments were carried out in two localities in Norway in 1955 and 1956.

420. Byrde, R. J. W.
A note on the control of brown rot of apples by griseofulvin.
Plant Path., 1959, **8**: 90-3, bibl. 14.

Griseofulvin applied at 0·05% or 0·1% significantly reduced infection by brown rot (*Sclerotinia fructigena*) of Laxton's Superb fruits in three seasons' trials. It is suggested that griseofulvin acts systemically.—Long Ashton Res. Stat., Bristol.

421. Liebster, G., and van Eimern, J.
Hilfsinstrumente zur Bestimmung der Spritztermine in der Schorfbekämpfung. (**Instruments for determining the date of spraying in scab control.**)
ErwObstb., 1959, **1**: 70-4, bibl. 14, illus.

Instruments are described, which record the duration of the period during which the surface of the leaf is moist, and also the temperature during this period.—Inst. Obstb., Weihenstephan.

422. Byrde, R. J. W., and others.
Spraying experiments against apple scab at Long Ashton, 1958.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 115-18, bibl. 6.

Five fungicides, each applied 3 times during the season, were tested in a small-scale trial against apple scab on Worcester Pearmain bush apple trees. *n*-Dodecylguanidine acetate (0·091%) and phenyl mercury salicylanilide (0·002% Hg) gave promising results, reducing leaf scab by 84% and 83% and fruit scab by 87% and 72%, respectively. No phytotoxicity was observed. Both compounds appeared to check a light attack of apple mildew and also to reduce damage by red spider mite. *o*-Hydroxy-diphenyl and 2:4-dichloro-6-(*o*-chloroanilino)-*s*-triazine were unsatisfactory: the former had little effect on scab whilst the latter caused severe fruit russet. [From authors' summary.]

423. Cinq-Mars, L., and Crête, R.
Résultats de quatre années d'expériences avec de nouveaux fongicides contre la tavelure du pommier. (**Results of four years' experiments with some new fungicides for the control of apple scab.**) [English summary ¼ p.]
Rep. Que. Soc. Prot. Plants 1958, 1959, **40**: 114-21.

Control was very satisfactory with captan, glyodin or Thioneb, but less so with Niacide, which, however, produced the highest yields, greatest yield increases and largest fruits, as well as shoots longer than average. The other 3 products increased yields in the decreasing order, Thioneb, captan and glyodin, and the last 2 slightly checked shoot growth. The incidence of russeting and the percentage of windfalls were approximately equal with all 4 fungicides.

424. Ostojić, N.
Vrednost nekih fungicida u suzbijanju čađave krastavosti jabuka. (**Trials of certain fungicides for controlling apple scab.**) [German summary ½ p.]]
Zasht. Bilja, 1958, No. 47/48, pp. 169-76.

Of the fungicides tested in 1956 and 1957 captan, zineb and wettable sulphur proved the most suitable, combining adequate fungicidal action with the least phytotoxicity.—Plant Prot. Inst., Belgrade.

425. Maček, J.
Iskustva sa nekim fungicidima i rokovima prskanja protiv čađave krastavosti jabuka—*Venturia inaequalis* (Cooke) Aderh.—na celjskom području. (**Experiments on the use and dates of application of certain fungicides against apple scab in the Celje district.**) [German summary ½ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 235-40, bibl. 7.

Curative treatments were found to be more effective than preventive or combined treatments, and applications during flowering damaged neither flowers nor pollinators. The most effective fungicides proved to be Venturicid (mercury base), captan and Nirit (rhodandinitrobenzol).—Hop growing Inst. Žalec.

426. Simard, J., Pelletier, R-L., and Coulson, J. G.
Biological properties and stability of crude culture filtrates of *Penicillium* spp. antagonistic to *Venturia inaequalis* (Cke.) Wint. [French summary ⅓ p.]
Rep. Que. Soc. Prot. Plants 1958, 1959, **40**: 141-2, bibl. 2.

Crude filtrates of *Penicillium* spp. were more ffective *in vitro* against *V. inaequalis* than penicillin at 300 mg./ml. or streptomycin at 40 mg./ml., ut were less effective than Acti-dione at 10 mg./ml. Their activity lasted at least 1 month at –17° C. and at least 15 days at 5° C., and was nimpaired by vacuum distillation. Crude filtrates f certain isolates applied repeatedly to apple eaves caused necrotic lesions, but a single application of one of these to leaves of apple, bean, abbage and tomato produced no injury. Spraying pple trees once with crude filtrates of the strains PS-1 or PS-33 gave up to 70% control of apple cab and 8% control of powdery mildew.

427. HILBORN, M. T., AND FARR, W. K.
Enzymes destroy fungi.
Amer. Nurserym., 1959, **110**(6): 119-20.

n laboratory experiments at Maine University, he enzyme chitinase, applied in water at 0·1 p.p.m., was found to destroy *Venturia inaequalis* and some ther fungi by dissolving the chitin in the cell walls. The enzyme caused the germ tubes of the ungi to rupture, which exposed the cell protoplasm nd resulted in death. It is considered that the principle could be extended to the use of other nzymes such as cellulase, proteases and lipases, which specifically attack other materials present n the cell walls of fungi.

428. LEFTER, G.
Comportarea unor soiuri de păr fată de atacul ciupercilor *Mycosphaerella sentina* (Fuck) Schroet. și *Endostigme pirina* (Aderh.) Sydow. (**Response of some pear varieties to the fungi *Mycosphaerella sentina* and *Venturia pirina*.**) [English, French, Russian and German summaries ¾ p. each.]
Grăd. Via Liv., 1959, **8**(2): 38-41.

The resistance to these two fungi of 21 common varieties of pear is tabulated. Bordeaux applied on May 16 and 25 reduced the attacks considerably even in the most susceptible varieties.

429. GOVI, G.
Nuova malattia per l'Italia. La cilindrosporiosi del ciliegio. (**A new disease in Italy—*Cylindrosporium* infection of cherry trees.**)
Ital. agric., 1959, **96**: 625-8, illus.

In Italy the fungus *Cylindrosporium padi* appears to be confined to the leaves of cherry trees, but in other countries it spreads to the fruits and young twigs. The ascospore form (*Coccomyces padi*) has not yet been reported in Italy. Control measures are being investigated, and preliminary recommendations comprise immediate removal of prematurely fallen leaves and 3 fungicidal sprays, at 4–5-week ntervals beginning immediately after flowering, using wettable sulphur, bordeaux mixture or zineb.

430. HEYNS, A. J.
A control experiment against the gumspot disease of peaches (*Clasterosporium carpophilum* (Lév.) Aderh.).
Dec. Fruit Gr, 1959, **9**: 183-4, bibl. 2.

Excellent control of gum spot disease in an Early Dawn peach orchard was obtained when an early autumn bordeaux (10·5% copper) spray, applied at 50% leaf fall, was followed by another 4 or 6 weeks later. Spring treatment at 100% petal fall had little effect on the disease.

431. HUTTON, K. E., AND KABLE, P. F.
Brown rot of stone fruits.
Contr. biol. Branch N.S.W. Dep. Agric. **397**, 1959, pp. 3, illus.

Protective spray programmes are given for apricot, cherry, peach, nectarine, plum and prune.

432. LEWIS, F. H., AND HICKEY, K. D.
Some new information on black knot and brown rot of plums.
From abstr. in *Phytopathology*, 1959, **49**: 524.

Knots on large limbs were effectively removed by rough surgery followed by a wound paint of 200 p.p.m. Acti-dione in water. In field tests on Stanley prunes zineb, Niacide-M, mercury, sulphur, ferbam, captan and dichlone gave good to fair black knot control, in the order named. Only captan, dichlone, and mercury gave control of brown rot blossom blight. Captan was safe to use on the trees, mercury caused leaf injury in the first spray after bloom, and dichlone caused leaf injury in the second spray and fruit injury in the third spray after bloom.

433. GROSCLAUDE, C.
Le traitement de la cloque du pêcher. (**Control of peach leaf curl.**)
Pomol. franç., 1959, No. 6, pp. 2-3, bibl. 1.

Three winter applications of bordeaux were required for complete protection against peach leaf curl. High-volume ziram sprays gave excellent control, a single spray in early March being sufficient; results with low-volume applications of ziram were irregular. Two applications of a pyridine compound based on zinc also gave complete protection.—Stat. Path. veg. Sud-Ouest, Pont-de-la-Maye.

434. MASTEN, V.
Problem sušenja bresaka u N.R. Sloveniji. (Prethodno saopstenje.) (**The problem of apoplexy of peach trees in Slovenia. (Preliminary communication.).**) [English summary 1 p.]
Zasht. Bilja, 1958, No. 47/48, pp. 73-8, bibl. 7, illus.

Reasons are given for considering this disease to be caused by *Valsa leucostoma*.

435. ANON.
Thiram fungicide for fungus control in peaches and strawberries.
Agric. Newsl., 1959, **27**(3): 5.

Reports on the value of thiram showed that peach storage rots were reduced by half, that peach scab was reduced from an index of 74 to one of 6, and that protection of strawberries from *Botrytis* infection was up to twice that provided by any other fungicide.

436. DIEHL, —.
Untersuchungen über die Botrytisfäule an Erdbeeren. **(Studies on botrytis rot of strawberries.)**
Gesunde Pfl., 1959, **11**: 72-8, from abstr. in *Beerenobstschriftt.* 1959, No. 15, pp. 5-6.

Spraying with DPTD or TMTD and removal of the leaves at various periods did not control or prevent botrytis rot of strawberries. It is believed that, until resistant varieties are developed, annual replanting of the crop would solve the disease problem. Cultural measures are suggested for reducing the incidence of botrytis rot in strawberries grown for the usual period.

437. POWELSON, R. L.
Etiology and epiphytology of strawberry fruit rot caused by *Botrytis cinerea* Pers.
Diss. Abstr., 1959, **20**: 863, being *L.C. Card No. Mic.* 59-3412 of 100 pp.

In a study of factors affecting disease development there were indications that both varietal and nutritional influences were involved. The incidence of botrytis rot was increased by an autumn application of supplemental N fertilizer. In the field Siletz and Northwest strawberries were considerably more susceptible to rotting than Marshall fruits, but the difference in susceptibility was much less in greenhouse and laboratory experiments. In both varietal and fertilizer experiments the rate of fruit rot development was affected more by the degree of water-soaking of the tissues than by differences in varieties or fertilizer application.—Ore. St. Coll.

438. KLJAJIĆ, R.
Bela trulež grožđa—problem vinogradarstva Srbije. **(White rot of grapes, a problem in Serbian viticulture.)** [English summary $\frac{1}{4}$ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 159-61, bibl. 4.

Coniothyrium diplodiella, its life history and control as described in the literature.

439. GHILLINI, C. A.
La malattia della vite detta "sfaldatura": studio dell'agente patogeno, analisi della resistenza delle cv. e mezzi di lotta. **(The vine disease known as "scaling": a study of the pathogen, analysis of varietal resistance, and control measures.)** [English summary $\frac{3}{4}$ p.]
Riv. Vitic. Enol., 1959, **12**: 223-38, illus., and 259-76, bibl. 22, illus.

The pathogen is the imperfect form of a Basidiomycete, showing certain characteristics of the *Fibrillaria* type. It causes disintegration of the bark at the base of the stem and upper part of the root. Vines of the Riparia group are the most resistant. Laboratory tests suggest that good control may follow the application of lime, iron sulphate, copper sulphate or any of the organic fungicides ferbam, B500 or thiram. Control measures are particularly necessary in nurseries.

440. V.—, P.A.
L'excoriose en automne dans le midi. **(Excoriosis of vines in autumn in southern France.)**
Progr. agric. vitic., 1959, **152**: 204-6, illus.

Winter treatment with sodium arsenite is recommended for control of *Phoma flaccida*.

441. MASTEN, V.
Sušica grozdića vinove loze. (Prethodno saopštenje.) **(Tuberculosis of vines. (Preliminary communication.).)** [German summary $\frac{1}{2}$ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 155-8, bibl. 14.

Produced by a *Phoma* sp. and prevented by copper sprays.

442. KRSTIĆ, M., AND HOČEVAR, S.
Ogledi uništavanja izdanačke sposobnosti panjeva pitomog kestena. **(Some methods of preventing the sprouting of sweet chestnut stumps.)** [English summary 1 p.]
Zasht. Bilja, 1958, No. 47/48, pp. 213-18, illus.

When chestnut trees infected with *Endothia parasitica* are felled, the sprouts which develop from the stumps become a serious source of infection. Several chemical treatments to prevent re-sprouting were tested in the years 1953–57. It is concluded that stumps and 1-year-old sprouts are best treated with a 0·5% water emulsion of Tormon-80 (2,4,5-T base), and 2–3-year-old sprouts with a 1% emulsion. Stumps could also be killed by covering them with earth, watered with a 2·5% solution of Kreozan (DNC) and dusted with 0·7 kg. sodium silico fluoride per stump.—Fac. For. Belgrade, and For. Inst. Ljubljana.

Nematodes.

443. SOUTHEY, J. F. (EDITOR).
Plant nematology.
Tech. Bull. Minist. Agric. Lond. 7, 1959, pp. 175, bibls, illus., from H.M.S.O., London, 9s. 6d.

This bulletin is based on a course of lectures held at the N.A.A.S. Regional Headquarters, Bristol, in 1956. Brief mention is made of nematodes attacking horticultural crops, including carrots, trawberries and tomatoes, and the principles of ematode control are discussed.

444. ELMER, O. H.
Plant parasitic nematodes.
Circ. Kans. St. Coll. Agric. **365**, 1958, pp. 37, illus.

he subjects discussed include the symptoms and ffects of attack, a description of the nematode enera, and control by cultivation, crop rotation, rap crops, nematode-free planting stock, hot-vater treatment, resistant varieties and nematicides volatile-liquid, gaseous and solid).

445. ALLEN, M. W., MAGGENTI, A. R., AND OTHERS.
Plant parasitic nematode injury to California crops.
Calif. Agric., 1959, **13**(9): 2-28, illus.

The September issue of *California Agriculture* ontains 11 articles on aspects of nematology of mportance to California. The authors discuss he economic importance of, and up-to-date ontrol methods for, nematodes attacking vegeables, vines, citrus, avocadoes, deciduous fruit nd nut trees, and ornamentals.

446. SCOGNAMIGLIO, A.
Lotta biologica contro i nematodi. **(Biological control of nematodes.)**
Ital. agric., 1959, **96**: 815-19, bibl. 8, illus.

Mainly by fungi; a review.

447. HARRISON, B. D., AND CADMAN, C. H.
Role of a dagger nematode (*Xiphinema* sp.) in outbreaks of plant diseases caused by arabis mosaic virus.
Nature, 1959, **184**: 1624-6, bibl. 16.

Evidence is outlined which suggests that a *Xiphinema* sp., probably *X. diversicaudatum*, is the ector of raspberry and strawberry diseases caused y arabis mosaic virus. Tests of nematicides ndicate that effective control could be achieved y their use.—Rothamsted exp. Stat., Harpenden, nd Scot. hort. Res. Inst., Invergowrie.

Mites.

(*See also* 119, 470, 518, 521.)

448. VAN DE VRIE, M.
Het acarologisch onderzoek. **(Acarological studies.)** [English summary 1 p.]
Jversl. Proefst. Fruit. Wilhelminadorp, 1958, pp. 53-77, illus.

Red spider mite. In 1957 parathion-resistant mites on apples were effectively controlled by pre-blossom sprays of PCPBS, Kelthane or Chloroparacide; a second application after flowering did not improve control. In a second trial with a spray application made only after flowering, parathion-resistant mites were effectively controlled by PCPCBS and Chloroparacide. In preliminary trials 0·2% Gusathion also gave good mite control. Unsatisfactory control of mites by PCPCBS and Chloroparacide in some orchards was attributed to mite resistance, but this could not be confirmed in laboratory tests; there was also some evidence of resistance to Kelthane. [For earlier work see *H.A.*, 29: 3438.] *Black currant gall mite*. Endrin sprayed at weekly intervals during the migration period (April and May) markedly reduced infestation by *Phytoptus ribis*. Four sprays of wettable sulphur controlled mites but were somewhat phytotoxic. Endrin also gave satisfactory control of black currant leaf midge (*Dasyneura tetensi*). There were indications that gall mites from black currants were not identical with those from red currants. *Strawberry mite*. Further transmission experiments confirmed that the tarsonemid mite on strawberry is not identical with that on cyclamen. Post-harvest sprays with endrin, Kelthane or thiodan gave complete control of the strawberry mite, when applied by high- but not low-volume methods.

449. POST, A.
Het biocoenotisch onderzoek in boomgaarden. **(Biocoenotic research in the orchard.)** [English summary 1 p.]
Jversl. Proefst. Fruit. Wilhelminadorp, 1958, pp. 78-84, illus.

Eversdijk Orchard. Studies on the effects of several cultural treatments on insect and mite populations were started in a neglected orchard. Populations of *Metatetranychus ulmi* increased both in sprayed plots and in unsprayed plots which had been pruned and manured. *Bryobia rubrioculus* and various parasites almost disappeared in the sprayed plots, but populations were variable in the unsprayed, manured plot. Populations of woolly aphid and green apple aphid increased greatly on the unsprayed, manured and pruned plot. In the non-manured, non-pruned plot the aphids had disappeared by the end of July. *Kuenen's Hof*. Several cultural treatments were started in a young well-kept orchard. Populations of *Metatetranychus ulmi* and *Bryobia rubrioculus* were higher in manured than in non-manured plots; populations of predacious mites and insects were about equal in both plots. Leaf analyses indicated that relatively low leaf N contents resulted in lower mite populations, and this was confirmed in pot experiments. Both pruning and manuring again favoured the development of woolly and green aphid populations. On caged trees of Cox, the introduction of the mite *Kampimodromus elongatus* considerably reduced red spider mite populations.

450. SUBIRÁ ROCAMORA, E.
La lucha contra la araña roja. **(Control of red spider mites.)**
Rev. Inst. agríc. catal., 1959, **108**: 15-18, 33-6.

In Catalonia *Tetranychus telarius* is a serious pest on fruit trees, small fruits and carnations. Nearly all the acaricides tested were effective only against the adult form, and winter treatments with mineral oil emulsions had to be repeated a number of times. Organic phosphorus compounds, e.g. hexaethyl tetraphosphate, had the most rapid action against adult mites on carnations. Some strawberry growers claimed that sodium carbonate, or sodium chloride, gave as good results as many of the acaricides. Chlorbenside proved toxic to adults, larvae and eggs. In apple, pear and cherry orchards, chlorbenside at 2·5 kg. per 1,000 l. applied as a mist gave excellent control of severe infestations after a single application, and a repetition of the treatment after a 10-day interval completely exterminated the pest. Results with carnations were equally good. In mushrooms the only disadvantage was a slight retardation of mycelial growth, which was more than offset by the complete extermination of the pest.

451. Adamič, J.
Crveni pauk. Novi problem voćarstva u N.R. Sloveniji. **(The spider mite, a new problem for fruit growers in Slovenia.)** [German summary ¾ p.]
Zasht. Bilja, 1958, No. 49/50, pp. 135-41, bibl. 4.

Paratetranychus althaeae is the commonest spider mite on fruit trees in Slovenia, while *P. pilosus*, *Bryobia praetiosa* and *Tetranychus althaeae* are found only in confined areas. On the basis of experiments, the results of which are tabulated, growers are recommended to apply a systemic insecticide before flowering and to follow this up with 2–3 sprays, at monthly intervals, of an ovicide or Cosan.

452. Kriegler, P. J.
Red spider on deciduous fruit. Mite develops resistance against proved preparations.
Fmg S. Afr., 1959, **35**(7): 36-7, illus.

Kelthane or Dimite are recommended for control of red spider mites, which have developed resistance to organic phosphorus materials.—W.P. Fruit Res. Stat., Stellenbosch.

453. Cutright, C. R.
Rotational use of spray chemicals in insect and mite control.
J. econ. Ent., 1959, **52**: 432-4, bibl. 2.

Examples are quoted, mainly with reference to apple pests, showing the effectiveness of pesticide rotation in preventing the development of resistant species. A rotational spray programme is suggested for the control of *Panonychus ulmi* in the years 1959 to 1962.—Ohio agric Exp. Stat., Wooster.

454. Parent, B., and Cinq-Mars, L.
Influence de quelques fongicides sur le tétranyque rouge du pommier, *Metatetranychus ulmi* (Koch). **(The effect of some fungicides on the red spider mite, *Panonychus (Metatetranychus) ulmi*, on apple trees.)** [English summary 6 lines.]
Rep. Que. Soc. Prot. Plants 1958, 1959, **40**: 137-40, bibl. 3.

Populations of red spider mite were 3–4 times higher on trees treated with captan or Niacide than on those treated with glyodin or Thioneb, but the fungicides did not differ in their effects on the predators of the mite.

455. Baturin, V., Abdullaev, S., and Zahrjapina, T.
Orchard spraying with carbolineum during the growing season against fruit mites. [Azerbajdžan.]
Soc. s. H. Azerb., 1957, No. 7, pp. 47-9, from *Ref. Ž.* (*Biol.*), 1958, No. 14, Abstr. 64,092.

On July 18 apple trees in 2 plots of 6 ha. each were sprayed with a 0·2% suspension of DDT dust, to which on one plot 0·25% carbolineum was added. On July 21, on the plot without carbolineum, an increase in mite populations was noted. On the other plot the number of mites on the variety Kandil'-sinap was reduced by half and on Sary-turš to one third, as a result of the death of adults and larvae. The eggs of the mites were not killed.

456. Asquith, D.
Mite injury sharply decreases apple tree yields.
Science for the Farmer, 1959, **6**(4): 6, illus.

The yields of trees not sprayed with acaricides in 1957 and 1958 averaged less than half those of the sprayed trees in the second year, and no serious bronzing of the leaves was observed on the latter.—Fruit Res. Lab., Arendtsville, Pa.

457. (Burts, E.)
Variety of sprays check blister mites.
Bett. Fruit, 1959, **54**(2): 17.

Blister mites [*Phytoptus pyri*] in apple and pear orchards are best controlled by a post-harvest spray of lime-sulphur or diazinon, but, should this be impractical, a dormant or delayed dormant spray of lime-sulphur plus dormant oil or of DNC is recommended.

458. Kriegler, P. J.
New information on control of pear bud mite.
Fmg S. Afr., 1959, **35**(7): 9-10, illus.

Parathion and Metasystox have given control of *Phytoptus pyri* equal to, or better than, standard treatment with wettable sulphur. Recommendations are given for the addition of either material to the codling moth spray. [For earlier work see *H.A.*, 29: 284.]—W.P. Fruit Res. Stat., Stellenbosch.

459. (ANTHON, E. W.)
Varied sprays give rust mite control.
Bett. Fruit, 1959, **54**(2): 22.

Cherry rust mites may be satisfactorily controlled by sprays of wettable sulphur, Kelthane, Trithion, Sulphenone, Dithane, Volk oil, Systox or Sytam. Sprays should be applied in the pre-bloom or shuck stage, and again at the end of May. For peach silver mite control the same materials may be used, but the second spray should be applied at the end of June or in early July.

460. KEMP, W. S.
Yellow leaf spot, fruit pimpling and cracking of nectarine and peach.
Orchard. N.Z., 1959, **32**: 215-17, illus.

Pink-bud and petal-fall applications of methyl demeton (1 pint/100 gal.) or endrin (1 quart/100 gal.) to Hunt's Tawny nectarine trees gave almost complete freedom from malformed, cracked and spotty fruit and associated leaf symptoms. Peach silver mite (*Vasates cornutus*) is thought to be responsible for yellow leaf spot, but not for the fruit symptoms. Further treatments, including post-harvest or dormant sprays of sulphur, are to be tried.

461. PUTMAN, W. L., AND HERNE, D. C.
Gross effects of some pesticides on populations of phytophagous mites in Ontario peach orchards and their economic implications.
Canad. Ent., 1959, **91**: 567-79, bibl. 23.

In peach orchards of the Niagara Peninsula DDT sprays promoted severe annual infestations of the European red mite, *Panonychus ulmi*, and more sporadic ones of the two-spotted spider mite, *Tetranychus telarius*, and the four-spotted spider mite, *T. canadensis*. Numbers of the brown mite, *Bryobia arborea*, were increased to a lesser extent. The European red mite developed strains resistant to parathion and became more troublesome than before this insecticide was used. Sulphur sprays generally promoted increases of the European red mite but these were not always serious. Sulphur was very toxic to the brown mite and the peach silver mite, *Vasates cornutus*. The fungicide captan showed no tendency to promote infestations of any species of mite. Mites would evidently not be troublesome on peach in the area if DDT, parathion, and sulphur were omitted from the spray schedule, but omission of the first two materials is not practical because of the need to control the oriental fruit moth. [From authors' summary.]—Canada Dep. Agric., Vineland, Ont.

462. WILLIS, R. J.
Experiments on the control of big bud of black currants.
Res. exp. Rec. Minist. Agric. Belfast, 1959, **8**: 1-8, bibl. 4.

Introduced into acaricide trials in 1956, endrin proved to be the only compound more effective against *Phytoptus ribis* than the petroleum oil formulations in general use. An endrin spray containing 0·04% active ingredient, applied on April 21 and May 27 in 1958, reduced the incidence of big bud by 70%, whereas the reduction obtained by 5% petroleum oils was under 50%. No damage to the bushes or alteration in fruit quality was observed.

463. COLLINGWOOD, C. A., AND BROCK, A. M.
Ecology of the black currant gall mite (*Phytoptus ribis* Nal.).
J. hort. Sci., 1959, **34**: 176-82, bibl. 4.

Data are presented on seasonal population cycles of, and periods of infestation by, the black currant gall mite. A single application of endrin gave the best control when applied at fruit set, but was least effective when applied at the grape stage, the traditional time for spraying against the mite.—N.A.A.S., Shardlow Hall, Shardlow, Derby.

464. FJELDDALEN, J., AND STENSETH, C.
Nye kjemiske midler for bekjempelse av jordbaermidd. (*Tarsonemus pallidus* Banks.) **(New acaricides for the control of strawberry mite.)**
Frukt og Baer, 1958, **11**: 37-41, illus.

In glasshouse and field trials, carried out in 1956–1957, endrin (19·5% emulsion in 0·2% solution) and Kelthane (25% in 0·2% solution) proved successful against the strawberry mite. The good results obtained with parathion on earlier occasions were also confirmed. Other acaricides tested were less effective. Two applications, with a 10–12-day interval, immediately after harvesting were found to be more efficient than earlier spraying.

465. AMBROSI, M., AND LENARDUZZI, R.
Prove di lotta contro l'acaro giallo della vite. **(Experiments on control of the yellow mite of vines.)**
Progr. agric., 1959, **5**: 796-807, illus.

The most satisfactory control of the yellow mite (*Eotetranychus carpini*) was achieved with late spring applications of a mixture of products effective against eggs, larvae and adults. Except for heavy infestations, a single treatment in May was usually adequate, and avoided reducing the population of *Typhlodromus vitis*, the mite predator of *E. carpini*, below effective levels. Systemic insecticides gave good control of the pest, but their toxicity to predators was a disadvantage. Winter treatments retarded, but did not eliminate, spring infestations. The most satisfactory of these treatments consisted of cleaning the bark by hand using a special glove and steel brush, and then applying lime-sulphur at 6 or 8 Bé shortly before bud-burst. Lime-sulphur spraying without bark cleaning was less successful but more economic, and reduced the control from 92·7 to 83·4%. The addition of

0·35% parathion to lime-sulphur decreased its effectiveness. A 1% emulsion of oil containing parathion gave 78·6% control when used at a suitable temperature, but isobutylphenol compounds were not sufficiently effective to justify their application in winter.

466. López Cristóbal, U.
Calepitrimerus vitis Can. Eriophyidae—Phyllocoptinae, Acarina—Trombidiformes, parasito especifico de la vid nuevo para la fauna argentina. **(*Calepitrimerus vitis*, a specific vine parasite new to the Argentine fauna.)**
Rev. Fac. Agron. La Plata, 1958, **34**: 91-4, bibl. 4, illus.

Of the control measures so far tested against this mite the most effective is spraying in winter and spring with lime-sulphur. Wettable sulphur sprayed in summer comes next in effectiveness. Phosphorus preparations and chlorinated compounds have proved less satisfactory.

Insect pests.

(*See also* 119, 291, 389, 449, 518, 521, 522, 1447, 1476.)

467. Coutin, R.
Quelques considérations sur les époques de traitement des arbres fruitiers. **(Some observations on times of treatment for fruit trees.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 498-501, bibl. 29, illus.

Dates or other criteria are suggested for the application of insecticides to control apple blossom weevil (*Anthonomus pomorum*), pear blossom weevil (*A. cinctus*), pear gall midge (*Contarinia pyrivora*), sawflies (*Hoplocampa* spp.), winter moth (*Operophtera brumata*), pear sucker (*Psylla pyri*), codling moth (*Laspeyresia* [*Enarmonia*] *pomonella*), and lentil weevil (*Bruchus lentis*).

468. de Jong, D. J.
Het entomologisch onderzoek. **(Entomological studies.)** [English summary 1¼ pp.]
Jversl. Proefst. Fruit. Wilhelminadorp, 1958, pp. 43-53, illus.

Tortrix moths. In studies on combined chemical and biological control, it was found that the degree of natural parasitization in sprayed orchards was 1·3–7·1%, and in 2 unsprayed orchards it was 22–39% and 5–17·7%. *Cacoecia rosana.* Both DDT and Perthane gave good control of these leafrollers, but thiodan was not satisfactory. *Rosy leaf-curling aphis. Sappaphis devecta* occurs mainly on large trees and on Belle de Boskoop and Bramley's Seedling, but James Grieve and Cox appear to be resistant. *Dock sawfly.* Dipterex and diazinon gave very good control of *Ametastegia glabrata* and control by Perthane was almost as good. *Orthosia spp.* In laboratory tests Perthane and Rothane gave an almost complete kill of larvae.

469. Tadić, M.
Mogućnosti i perspektive biološke borbe u Jugoslaviji. **(Possibilities and prospects of the biological control of pests in Yugoslavia.)** [English summary ½ p.]
Zasht. Bilja, 1958, No. 49/50, pp. 193-9, bibl. 10.

San José scale, gypsy moth, oriental fruit moth and olive fly.

470. Kurtz, E. A., and Fullmer, O. H.
Two new phosphates for control of overwintering eggs of aphids and mites on deciduous fruit trees.
J. econ. Ent., 1959, **52**: 377-9, bibl. 8.

Dormant and delayed dormant sprays of ethion-oil and Phostex-oil have given excellent control of rosy apple aphid (*Anuraphis roseus*) on apple, mealy plum aphid (*Hyalopterus pruni*) on prune, black cherry aphid (*Myzus cerasi*) on cherry, European red mite (*Panonychus ulmi*) on all 3 fruit species, and of clover mite (*Bryobia praetiosa*) on prune and cherry. In general, more toxicant and oil were needed during the dormant than during the delayed dormant period for equal control of rosy apple aphid and the two mites. The amount of materials required for control of the mealy plum and black cherry aphids was constant during the whole dormant period. [For use of these materials against scales, see abstr. 506.]—Niagara chem. Div., Food Mach. chem. Corp., Richmond, Calif.

471. Madsen, H. F., and Bailey, J. B.
Control of the apple aphid and the rosy apple aphid with new spray chemicals.
J. econ. Ent., 1959, **52**: 493-6, bibl. 5.

Orchard trials for the control of rosy apple aphid (*Anuraphis roseus*) and apple aphid (*Aphis pomi*) were conducted on Yellow Newtown and Red Delicious in 1957 and 1958. Delayed dormant sprays of ethion-oil, Phostex-oil and Trithion-oil against the egg stage of rosy apple aphid gave control equal to that given by the standard oil-dinitro sprays, and did not injure the cover crop. As foliage treatments for the control of this aphid, the systemic compounds demeton, Thimet, dimethoate, Am. Cyanamid 18706 and Di-syston were satisfactory. Of non-systemic materials only diazinon provided control of the rosy apple aphid. In summer treatments against the apple aphid the systemic compounds Thimet, Di-syston, Am. Cyanamid 18706 and dimethoate gave the best control. Non-systemic insecticides, though reducing populations, did not prevent reinfestation and rapid build-up. [From authors' abstract.]—Univ. Calif., Berkeley.

472. Vereščagina, V. V.
The ecology of woolly aphid and its control in Moldavia. [Russian.]
Tr. Mold. n.-i. In-ta Sadov. Vinograd. i Vinodel., 1957, **3**: 255-66, from *Ref. Ž.* (*Biol.*), 1958, No. 14, Abstr. 64,094.

This aphid is most vulnerable in the early spring when its waxy integument is not yet fully developed and when it is found on the stem and root neck of apple trees. Dusting the above-ground parts with 12% BHC at 0·5 kg. per tree and the soil around with 60 g. per sq. m. gave effective control. On the roots it was completely eradicated by soil fumigation with dichloroethane residues at 0·1 kg. per tree. Summer colonies were eliminated by sprays of 0·4% Wofatox emulsion, 0·1% NIUIF-100, 0·1% Mercaptophos or diesel-fuel paste with 2–3% DDT. Spraying the stems at the beginning of October with a 3% carbolineum emulsion + 3% BHC dust was also satisfactory.

473. El-Haidari, H.
The biology of the filbert aphid, *Myzocallis coryli* (Goetze), in the central Willamette Valley.
Diss. Abstr., 1959, **20**: 1103, being *L.C. Card No. Mic.* 59-3403 of 79 pp.

Nuts from aphid-infested trees were inferior in appearance to those from Systox-treated trees, but there was no difference in size, weight or fat content between the two groups.—Ore. St. Coll.

474. Briggs, J. B.
Three new strains of *Amphorophora rubi* (Kalt.) on cultivated raspberries in England.
Bull. ent. Res., 1959, **50**: 81-7, bibl. 8.

Their distribution and importance discussed.

475. Stellwaag, F., and others.
Lutte contre le phylloxera. **(The control of phylloxera.)**
Bull. off. int. Vin, 1959, **31**(338): 52-86, bibl. 40; (339): 19-53, bibl. 51.

National reports from 8 countries.

476. Pelet, F. J.
Growth *in vitro* of grape, elm, willow, poplar, and oak tissues isolated from normal stems and insect galls.
Diss. Abstr., 1959, **20**: 469-70, being *L.C. Card No. Mic.* 59-2775 of 123 pp.

The growth responses of various tissues (including normal grape stem and leaf tissues, and leaf galls induced by *Phylloxera*) were studied on various media. The responses of normal and gall tissues were similar, which suggests that the original stimulus to gall formation did not last. Extracts of aphids and eggs promoted tissue growth when introduced into the basal medium.—Univ. Wis.

477. Kajtazov, A.
***Capnodis tenebrionis* L. Biology and control.** [Bulgarian, with Russian and German summaries.]
Nauč Trud. nauč-izsled. Inst. Zašč. Rast., 1958, **1**: 161-87, bibl., illus., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 130.

Both adults and larvae were found on plum, apricot, peach, cherry, almond, essential oil-bearing rose, dog rose, pear, quince and hawthorn. In laboratory and field trials the greatest toxicity and longest residual action against the adult beetles, which feed on the leaves, were shown by 1·5–2% toxaphene emulsion, 1·5–2% Toxol suspension, 1·5% Alona kombi [?] and 0·2% E605f., applied at 25-day intervals between June 1 and August 25. The most effective method for preventing infestation of the roots by *Capnodis* larvae was dipping the roots before planting in a 70 : 27 : 3 mixture of soil, cow dung and BHC, and painting the trunks up to 15 cm. above the soil surface with a mixture of E605f., BHC, lime and paradichlorobenzene. For larval control soil treatment with BHC or fumigation with carbon bisulphide is recommended.

478. Kriegler, P. J.
Fruit nibbler must be controlled now.
Fmg S. Afr., 1959, **35**(6): 19-21, illus.

DDT (2 lb. 50% w.p. to 100 gal. water) should be sprayed at 75% petal fall for control of the beetle *Odontionopa sericea*, which mainly attacks peaches, nectarines, plums and apricots.

479. Peyrek, B.
Otiorrhynchus (*Dodecastichus*) *mastix* štetnik jagodnih nasada na slov. primorju. (***Otiorrhynchus mastix*, a pest of strawberry plantations in the Slovenian littoral.**) [English summary ½ p.]
Zasht. Bilja, 1958, No. 49/50, pp. 67-72, bibl. 1.

Larvae attack the roots of 1- or 2-year-old plants, causing them to wilt and die. No spray successfully controlled the larvae during the winter, and the best control was obtained by using dieldrin-oil at 500 g. per litre against the weevils in early summer.—Inst. for Promoting Agric., Kopar.

480. Schmidt, L.
Rezultati bioloških pokusa sa insekticidima protiv pipa vrste *Otiorrhynchus lavandus* Germ. (**Results of insecticide trials against the curculio *Otiorrhynchus lavandus*.**) [English summary ½ p.]
Zasht. Bilja, 1958, No. 49/50, pp. 121-8.

The weevils attack vine buds in the spring and the leaves later in the year. Early control is essential if the crop is to remain undamaged, and the soil should be treated with insecticide during the emergence period. DDT, BHC and parathion were tested against the weevils, and it was found that 4–5 times the normal concentration was required to give effective control.—Coll. Agric. For., Zagreb.

481. Hering, M.
Die Bekämpfung des Gefurchten Dickmaulrüsslers *Otiorrhynchus sulcatus* F. in Deutschland unter besonderer Berücksichtigung neuerer Erkenntnisse. **(The control of the vine weevil, *Otiorrhynchus sulcatus*, in Germany, with special reference to recent findings.)**
Reprinted from *Weinberg u. Keller*, 1959, **6**: 211-19, bibl. 21.

Of the insecticides tested aldrin dust applied to the soil gave the most satisfactory results. [For earlier work see *H.A.*, 28: 3533.]—Inst. Rebenkrankh., Bernkastel-Kues/Mosel.

482. Whitehead, V. B.
Control of vine snoutbeetle. Apply DDT to stems only.
Fmg S. Afr., 1959, **35**(7): 18-19, illus.

Satisfactory control of the vine snoutbeetle (*Phlyctinus callosus*) may be obtained by 2 applications of DDT (3–4 lb. 50% w.p. per 100 gal.) to the vine stems up to a height of not more than 2 ft. from the ground. If the whole plant is sprayed, natural enemies of the mealybug will be destroyed.

483. Vessia, R.
La cimice del mandorlo. **(The almond bug.)**
Frutticoltura, 1959, **21**: 391-400, bibl. 12, illus.

The almond bug (*Monosteira unicostata*) occurs also on pear, apple, quince, cherry, plum, poplar and willow. The following control measures are recommended: (1) spraying in April and May with nicotine sulphate at 200 g./100 l. water, with the addition of soft soap; (2) winter treatments with polysulphides and mineral oils for combined control of aphids, scale insects and red spider mites. Spraying the trunks and main branches with 3% yellow oil containing DNOC gave good results at a low cost. Phosphoric esters were too drastic in action against useful insects.

484. Milaire, H.
La mouche méditerranéenne des fruits. Observations sur les attaques dans la moyenne vallée du Rhône. État actuel des moyens de lutte. **(The Mediterranean fruit fly. Observations on attacks in the central Rhône Valley. Control situation.)**
Pomol. franç., 1959, No. 7, pp. 9-13, bibl. 30, illus.

A review [for an earlier report see *H.A.*, 27: 346w].

485. Dorst, H. E.
Experimental control of *Drosophila* as it pertains to tomatoes.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 28-34.

In field trials to reduce ***Drosophila*** breeding in piles of cull peaches, a single application of the following granular insecticides, at a rate of 1 lb. per 10 bushels of peaches, gave 80–99% control for at least 28 days: 2% endrin, 2½% lindane, 10% malathion, 1% diazinon, 5% BHC, 2½% dieldrin, 5% heptachlor, 5% Dibrom, 10% DDT, 5% DDVP, 10% chlordane, and 2½% aldrin. A bait consisting of 30% molasses, 26% vinegar and 4% yeast in water, absorbed in Panacalite, and containing 0·02% diazinon or malathion, was also spread as wet flakes in tomato fields, and gave 58–69% control of *Drosophila* for 10 days.

486. Stafford, E. M., and Warner, R. M.
Spray tests for control of *Drosophila* in Adriatic figs.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 24-6.

The failure of spray schedules of malathion and diazinon to show adequate control of *Drosophila* in a fig orchard in Fresno county is ascribed to re-infestation from a nearby peach orchard.

487. Warner, R. M.
Radioactive tagging for tracing movements of *Drosophila*.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 35-7.

Using bait containing P^{32}.

488. Yerington, A. P.
Problems in the control of *Drosophila* in the field.
Proc. 13th annu. Res. Conf. Calif. Fig Inst., 1959, pp. 37-41.

The long flight range of this fly makes small-scale control ineffective in areas where fruit growing is concentrated. Block area spraying and more extensive use of baits are recommended.

489. N—., A.
Il verme delle ciliege (*Rhagoletis cerasi* L.). **(The cherry fruit fly, *Rhagoletis cerasi.)***
Tecn. agric., 1959, **11**: 144-9, illus.

Very early cherry varieties, such as Majulina, generally escape attack, while mid-season and late varieties vary in susceptibility, Tenerine being more susceptible than Duracine and Amarene. In trials with Fostion MM (dimethyl dithiophosphorylacetic monomethylamide) 20% emulsion, 75 g. of the commercial product per 100 l. water gave control for 10 days, and 250 g. gave control for 20 days.—Ist. Ent. agrar. Univ. Catania.

490. RUI, D.
Arseniati od esteri fosforici nella lotta anticidia? **(Arsenates or phosphoric esters for codling moth control?)**
Frutticoltura, 1959, **21**: 545-6.

Extensive tests on apple trees showed excellent control of codling moth by each of 3 treatments, namely 9 applications of 0·5% lead arsenate, or 9 applications of 0·4% lead arsenate + 0·1% phosphoric ester, or 11 applications of 0·15% phosphoric ester. Red spider mite infestation, however, was favoured by use of the ester, and lead arsenate would not be recommended in grassed orchards used for grazing, or where the fruit was grown for export to countries (such as Britain) stipulating 1 p.p.m. as the maximum residue for lead.

491. WILDBOLZ, T., AND STAUB, A.
Erfahrungen über das Auftreten und die Bekämpfung des Apfelwicklers im Jahre 1959. **(Observations on the incidence and control of the codling moth in 1959.)**
Schweiz. Z. Obst- u. Weinb., 1959, **68**: 546-52, bibl. 1.

With tabulated data on control experiments in apples, with special reference to time of spraying.

492. BALEVSKI, A., AND OTHERS.
The codling moth (*Laspeyresia pomonella* L.). Biology, ecology, control and the possibilities of organizing a warning service. [Bulgarian, with Russian and German summaries.]
Nauč. Trud. nauč.-izsled. Inst. Zašč. Rast., 1958, **1**: 109-58, bibl., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 122.

The most effective control was obtained with DDT and thiophosphorus preparations. These showed the longest residual action and gave the best results on apple varieties with a thick waxy cuticle. Results of 6 years' observations indicate that a warning service should be based on stage of insect development.

493. ZOCENKO, L. N., ABDULLAEV, S. G., AND ZAHRJAPINA, T. D.
Something new in the control of codling moth. [Russian.]
Zašč. Rast. ot Vredit. i. Bolez., 1957, No. 2, pp. 41-8, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 49,650.

Of 3 spray schedules tested, one application of a 0·2% suspension of DDT plus bordeaux, followed by 2 applications of the same mixture plus a 0·15% suspension of thiophos, was the best. It greatly reduced the percentage of fallen fruit attacked by codling moth and scab. The treated plots yielded 348·4 centners/ha. of which 27·8% were windfalls, compared with 211·7 cent./ha. and 54·4% respectively in the controls.

494. ZOCENKO, L. N., AND ŽIGAL'CEVA, M. I.
Aircraft spraying against codling moth. [Russian.]
Sb. Tr. Mold. St. Uses. In-ta Zašč. Rast., 1957, No. 2, pp. 107-14, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 49,654.

One aerial application of 5% bordeaux plus a 0·8% emulsion of DDT at 250 l./ha. on June 9, followed by applications on June 24 and July 4 of 0·8% DDT plus a 5% suspension of thiophos, gave much better control of codling moth and some other pests on apples than spray schedules which did not contain thiophos.

495. ROMANEVIČ, B. V.
Effective toxicants for trap bands. [Russian.]
Zašč. Rast. ot Vredit. i Bolez., 1957, No. 4, p. 16, from *Ref. Ž.* (*Biol.*), 1958, No. 14, Abstr. 64,088.

In Uzbekistan a 0·9% emulsion of methyl ethyl thiophos or of thiophos on trap bands caused 100% mortality of codling moth larvae during the first few days after application and remained toxic for 4 months.

496. JANCKE, G. D.
The willow moth, a pest in fruit orchards too.
Fmg S. Afr., 1959, **35**(7): 19-21, illus.

Abnormally large populations of willow moth (*Gonimbrasia tyrrhea*) may be prevented from spreading into orchards by spraying forest border trees with endrin (2 gal./100 gal.) when the larvae are first observed. Commercial willow and poplar plantations may be protected by aerial spraying.—W.P. Fruit Res. Stat., Stellenbosch.

497. IVANOV, S.
The leaf miner (*Lithocolletis corylifoliella.*) [Bulgarian, with English and Russian summaries.]
Nauč. Trud. nauč.-izsled. Inst. Ovošč, Sofija, 1958, **1**: 193-207, bibl., illus., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 128.

A description is given of this pest, observed for the first time in Bulgaria at Plovdiv in 1952 on apples, pears and quinces. Chemical control was best directed against the adults, 20% DDT at 1·5 kg./ha. and parathion or E605 at 50 c.c. in 100 l. water giving satisfactory results. The larvae within the leaf tissue are difficult to control, though Wofatox at 50 c.c. in 100 l. gave 94% mortality.

498. SYLVÉN, E.
Studies on fruit leaf tortricids (*Lepidoptera*).
Meddel. Statens Växtskyddsanst. **11:74**, 1958, pp. 135-296, bibl. pp. 4, illus.

Species and control, with special reference to the periodicity of the adult moths [see also *H.A.*, 29: 3460].

499. Wünsche, J., and Meier, G.
Zum Schadauftreten und zur Bekämpfung des Apfelschalenwicklers (*Capua reticulana* Hbn.). **(On the incidence and control of the apple tortrix moth, *Capua reticulana.)***
Dtsch. Gartenb., 1959, **6**: 222-3, bibl. 8.

In many orchards in East Germany *Adoxophyes orana* (syn. *Capua reticulana*) has established itself as a serious pest. Of the several chemicals, including systemic insecticides, tested on 6 August, 1958, the experimental preparation W 6612, a phosphoric acid ester, achieved the best control, viz. 85·7% at 0·3%. The omission of winter washes is, in the authors' view, not justified where growers are confronted with infestations of *A. orana*.—Inst. Obst- u. Gemüseb. Martin-Luther-Univ., Halle-Wittenberg.

500. Hey, G. L.
Apple damage riddle is solved.
Grower, 1959, **52**: 590-1, illus.

In some districts a new type of damage to developing apple fruits has been noticed, consisting of groups of small holes, generally superficial and each surrounded by a black ring. The damage is caused by a tortrix moth, *Pammene rhediella*. For control DDT should be applied at the end of May or very early in June. Sack banding is also recommended.

501. Markelova, V. P.
The leafrollers *Exapate congelatella* Cl. and *Cacoecia rosana* L. as pests of small fruit in the Leningrad region. [Russian, with German summary.]
Ent. Obozrenie, 1957, **36**: 355-69, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 49,681.

Control mainly with DDT.

502. (Burts, E.)
Pear psylla program encounters trouble.
Bett. Fruit, 1959, **54**(2): 22.

In Washington State dieldrin and toxaphene gave poor psylla control, but Guthion and Sevin were effective. Phosdrin has given a good kill of all active forms of nymphs but has a short residual life and high mammalian toxicity. Dilan shows promise against psylla.

503. Harries, F. H., and Burts, E.
Laboratory studies of pear psyllas resistant to dieldrin and some related compounds.
J. econ. Ent., 1959, **52**: 530.

Indications that dieldrin-resistant strains may have become more sensitive to Sevin.

504. Vasev, A., and Toševa-Cvetkova, C.
Bio-ecological studies on plum sawfly *(Hoplocampa minuta* Christ.) and its control in Bulgaria. [Bulgarian, with English and Russian summaries.]
Nauč. Trud. nauč.-izsled. Inst. Ovošč. Sofija, 1958, **1**: 157-89, bibl., illus., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 123.

The occurrence, life history and host range of the sawfly, and the injury it causes, are discussed. Of chemicals tested, the best results were obtained with 20% DDT in a 1% solution, 20–40 kg./ha. of 5% DDT dust, 20% DDT emulsion and 1·0–1·5% BHC emulsion. Satisfactory control was also obtained with 0·05% parathion and 0·05% E605f. For the combined control of sawfly and fungal diseases of plum the dust can be mixed with copper oxychloride and the sprays with 1% bordeaux.

505. Nagy, B.
Kísérletek a szilvadarazsak kártételének elhárítására. **(Experiments on the control of plum sawflies.)** [Russian and English summaries 1½ pp. each.]
Növénytermelés, 1959, **8**: 157-75, bibl. 23.

Almost complete control of plum sawflies (*Hoplocampa minuta* and *H. flava*) was obtained with Ekatox 20, Systox or BHC wettable powder in trials carried out during 1954–1956. A single application at the correct time, i.e. when the eggs were hatching, was nearly as effective as repeated sprayings. Good control increased the subsequent crop 2- to 3-fold.—Res. Inst. Plant Prot., Budapest.

506. Fullmer, O. H., Kurtz, E. A., and Wade, W. H.
Two new phosphate-oil combinations for scale control on deciduous fruit trees in the dormant period.
J. econ. Ent., 1959, **52**: 373-6, bibl. 5.

Ethion-oil and Phostex (a mixture of bis(dialkyloxyphosphinothioyl) disulphides)-oil sprays applied during the dormant period have given excellent control of San José scale (*Aspidiotus perniciosus*) on almond, peach and prune, of olive scale (*Parlatoria oleae*) on peach, and of European fruit lecanium (*Lecanium corni*) and frosted scale (*L. pruinosum*) on apricot, peach and prune. Trials conducted over a 2-year period indicated that the sprays provide equal or better control than the standard materials with less likelihood of tree injury. The optimum toxicant/oil ratios are discussed, and minimum rates for satisfactory control of each species are given. Both spray mixtures were compatible with basic zinc sulphate, zinc carbamate and fixed copper compounds, and the ethion-oil mixture has been successfully combined with lime-sulphur and sodium polysulphide.—Niagara chem. Div., Food Mach. chem. Corp., Richmond, Calif.

507. Brimblecombe, A. R.
Control trials against red scale on figs.
Qd J. agric. Sci., 1958, **15**: 215-39, bibl. 1, illus.

After trials with lime sulphur, parathion and white oil, the standard control adopted for red scale (*Aonidiella aurantii*) on figs was two applications of white oil, 80% w/w emulsion diluted 1–40, 2–3 weeks apart in January [mid-summer]. Both white oil and parathion were superior to lime sulphur, but white oil had the advantage over parathion in that, in a year in which premature leaf fall due at least in part to fig leaf rust (*Cerotelium fici*) was widespread, trees which had received copper and white oil sprays retained their leaves and yielded for a much longer period than did those receiving copper and parathion. White oil, moreover, did not adversely affect the entomophagous fungi attacking the scale.

508. Congdon, N. B., and Morrison, L. G.
Mealy bug problem in Hawke's Bay.
Orchard. N.Z., 1959, **32**: 249-51.

Recent experiments on control showed that organic phosphorus materials gave the best control of mealybugs in fruit orchards. Diazinon at 1 pt. and parathion at 15 oz. per 100 gal. reduced mealy bug infestation of pear fruits to 19·9% and 14·5% respectively. Cultural methods of control are also summarized.

509. Boulanger, L. W.
Control the apple mealybug.
Me Fm Res., 1959, **7**(1): 14-16, illus.

Control of *Phenacoccus aceris* nymphs was obtained by the addition of 1 pint of 50% low emulsifiable concentrate ethion to 2 gal. superior oil applied at the delayed dormant stage, followed by 2 applications of 2 lb. DDT 50% w.p. plus wetting agent per 100 gal. at 10-day intervals. If oil is not applied, 3 applications of DDT should be made. Control of crawlers is obtainable with either 2 lb. DDT plus wetting agent or 1 lb. Sevin 50% w.p. without wetting agent, applied 4 times at 14-day intervals, beginning in late June or early July.

510. Raichoudkury, D. P.
A short note on the study of "Tukra" disease of mulberry (*Morus* sp.) caused by *Phenacoccus hirsutus* Gr. (Coccidae).
Rev. Ver à Soie, 1958, **10**: 315-18, illus., from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 31,486.

This mealybug causes severe curling and crinkling of the leaves of apical shoots, and swelling and twisting of the stems, especially of the apical internodes. Of various insecticides tested for control, nicotine sulphate was the most effective. Experiments on biological control are in progress.

Other pests.

511. Murbach, R.
Est-on sans défense contre le campagnol terrestre (*Arvicola terrestris* L.)? **(Is there no protection against the field vole?)**
Rev. romande Agric. Vitic., 1959, **15**: 81-3.

Damage to fruit trees is discussed, and notes are given on control by gassing, underground cartridges, poisoned baits, traps, carbon monoxide poisoning (by petrol engine exhausts) and treatment of the undergrowth with toxaphene or endrin. Systematic trapping appears to be the most satisfactory measure.

Chemicals and their application.

(*See also* 120, 650, 1229, 1461.)

512. Wain, R. L.
Crop protection. Some achievements and future prospects.
Reprinted from *Meded. LandbHoogesch. Gent*, 1958, **23**: 579-86, bibl. 31.

Fungicides, insecticides and herbicides are briefly reviewed.

513. Tafradžijski, I., and Popov, S.
Injury to peaches caused by fungicidal sprays.
[Bulgarian, with Russian and French summaries.]
Nauč. Trud. Visš. selskostop. Inst. "Vasil Kolarov", Plovdiv, 1956, 1958, No. 5, pp. 53-63, bibl., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 100.

Four treatments were applied against fungus diseases on 23 peach varieties, and leaf injury was noted. On all varieties alkaline solutions of 0·5 and 0·75% bordeaux caused serious leaf damage, and slightly alkaline solutions of bordeaux at the same concentrations to which sunflower oil had been added were also injurious. Lime-sulphur at temperatures below 30° C. caused no leaf scorch. Barija's preparation (lime sulphur + zinc sulphate) at 1% was a very effective fungicide and caused no leaf injury. The sensitivity of peach leaves to bordeaux is partly due to their very thin cuticle.

514. Heuberger, J. W., and Eid, R. F.
Lead arsenate as an apple fungicide.
From abstr. in *Phytopathology*, 1959, **49**: 524.

Results are given of spraying trials against terminal scab, sooty blotch and botryosphaeria fruit rot with lead arsenate in combination with lime, captan or captan plus zineb. Although lead arsenate reduced infection, it was not so effective as the recognized fungicides.

515. BEIDAS, A. S., AND HIGGONS, D. J.
Mercury residues in sprayed crops. II. Apples.
J. Sci. Food Agric., 1959, **10**: 527-9, bibl. 4.

Mercury residues in apples, after fungicidal spraying, were less than 0·01 p.p.m. in 29 out of 33 samples, and under 0·1 p.p.m. in the others. [For part I see *H.A.*, 28: 524.]—Boots Pure Drug Co. Ltd., Nottingham.

516. WINTER, H. F.
Fungicide sprays may reduce fruit "set" and yield of apples.
Ohio Fm Home Res., 1959, **44**: 6.

Trials over 4 years indicated that a complete early season schedule of phenyl mercury sprays for scab control caused excessive fruit drop and reduced yield in young, but not in mature, apple trees, whereas methyl mercury compounds did not. Dichlone and Phybam S resembled the phenyl mercury compounds in their yield-reducing effect. The damaging sprays were those applied at petal fall and first cover, but the reduction of fruit set was not due to inadequate pollination.

517. SPENCER, E. Y. (CHAIRMAN).
Symposium on metabolism of insecticides.
Canad. J. Biochem., 1959, **37**: 1089-1151, bibls.

This symposium, sponsored jointly by the Chemical Institute of Canada and the Entomological Society of Canada, was held at Guelph in 1958. The following are among the papers presented: Insecticide resistance as a world problem, by A. W. A. Brown; Mechanisms of resistance to chlorinated hydrocarbons, by H. H. Moorefield; Comparative toxicology of some organophosphorus compounds in insects and mammals, by R. D. O'Brien; Enzyme relationships in the action of organophosphorus insecticides, by B. N. Smallman; Physiological events in organophosphorus poisoning, by E. H. Colhoun; The ovicidal action of organophosphate insecticides, by E. H. Smith and A. C. Wagenknecht; Significance of plant metabolites of insecticides, by E. Y. Spencer; Trends in insecticidal chemicals, a summary, by H. Martin.

518. HARROW, K. M.
Gusathion, Sevin and some other insecticides for control of pests on apple.
Orchard. N.Z., 1959, **32**: 199-200.

In several orchard treatments, Gusathion (25% w.p. at 2 lb./100 gal.) was more effective for general control of orchard pests than Sevin, Insecticide W.C.I. or Endocide. The degree of codling moth and leaf roller control by Gusathion was equal to, or better than, that given by standard DDT/DDD treatments, and control of mites and woolly aphids was also excellent. Gusathion should not, however, be applied within 2 months of harvest.—D.S.I.R., Auckland.

519. BERAN, F., AND GLOFKE, E.
Zur Kenntnis der Wirkung von Pflanzenschutzmitteln auf die Honigbiene (*Apis mellifica* L.). 3. Mitteilung: Der Nachweis von Bienenvergiftungen. **(A study on the effect of pesticides on honey bees. 3. The demonstration of bee poisoning.)** [English summary 20 lines.]
PflSch. Ber. Wien, 1959, **22**: 145-71, bibl. 12, illus.

Methods of determining DDT, parathion and lindane in bees. [For parts 1 and 2 see *H.A.*, 26: 1626 and 27: 1362.]

520. TAPE, N. W.
A study of the properties and mode of action of nystatin in relation to plant disease control, and of the chemical assay of streptomycin in plant tissue.
Diss. Abstr., 1959, **20**: 22-3, being *L.C. Card No. Mic.* 59-1832 of 100 pp.

Nystatin, an antifungal antibiotic, was inactivated in solutions of macerated tomato, tobacco and geranium leaves, and almost all of its activity was lost in the soil. Nystatin was not toxic to tomato, bean and gladiolus plants, even at a concentration of 6,000 units/ml. The antibiotic was not absorbed through the epidermis of blueberry fruits, but was absorbed into peach fruit and *Sedum* leaves. Cucumber and pea seeds were not protected by it from pre-emergence damping-off. Rooting of geranium cuttings was stimulated by 17 units of nystatin per mg. of talc, but not to a commercial extent. The incidence of blackleg disease in geranium cuttings growing in *Pythium*-infested soil was significantly reduced by dusting the base of the cuttings with 8·5 units of nystatin per mg. of talc. Rooting of tomato cuttings was not stimulated by standing their bases in nystatin solutions for 1 hour before insertion in sand. Low levels of nystatin were toxic to spore germination of *Monilia fructicola*, *Botrytis* sp., *Rhizopus* sp. and *Diplodia tubericola*, but uptake by the first 3 species was slow compared with that of other fungicides.—Rutgers Univ.

521. FREDERICKS, E. E. (AND MARSHALL, G. E.).
Controlling fruit tree insects.
Rep. Purdue Univ. agric. Ext. Serv./Exp. Stat., 1958, **1**(4): 12, illus.

Injections were made under high pressure of Systox and Thimet into the trunks of fruit trees. Aphids on treated apple trees were killed 5–20 days after treatment, and the method showed some promise of controlling scale insects. Web worms grew more slowly on Thimet-treated trees. Soil application of the insecticides in late May kept mite populations low.

522. Borzini, G.
Impolveratrici elettrostatiche ed uso di elicotteri in fitoiatria. **(Electrostatic spray equipment and the use of helicopters in plant protection.)**
Progr. agric., 1959, **5**: 1048-57, illus.

Cherry fruit flies (*Rhagoletis cerasi*) were completely controlled by a single low-volume spraying of the trees by helicopter with DDT + lindane or with Rogor. The cost was rather less than for 2 treatments with portable equipment. An electrostatic power-operated dusting machine, based on the knapsack principle and distributing zineb + sulphur with a positive electric charge, gave as good or better control of downy mildew (*Plasmopara viticola*) of vines than did the usual liquid treatment with copper-calcium oxychloride + wettable sulphur. With a dust formulation of the latter mixture, however, it gave much poorer results, probably owing to its coarseness compared with the zineb + sulphur powder.

523. Somers, E.
Studies of spray deposits. IV. Polyvinyl acetate as a sticker for copper fungicides.
J. Sci. Food Agric., 1959, **10**: 548-52, bibl. 6.

The influence of polyvinyl acetate (PVA) latex on the tenacity of cuprous oxide and burgundy mixture on the upper surface of daffodil, potato and tomato leaves has been determined in laboratory tests. PVA improved the tenacity of the fungicides on the leaf surfaces: the optimum concentration of the supplement was 1% (v/v). PVA was also found to improve the dispersion of the cuprous oxide suspension. There was no evidence that PVA reduced the fungitoxicity of cuprous oxide when assayed *in vitro* against *Alternaria tenuis.* [From author's abstract.—For part III see *H.A.*, 28: 332.]—Long Ashton Res. Stat.

524. David, W. A. L.
The accumulation and adhesion of insecticides on leaf surfaces.
Outlook on Agric., 1959, **2**: 127-36, bibl. 41.

A review of factors operating before, during and after impact.

525. Courshee, R. J.
Investigations on spray drift. Part II: The occurrence of drift. [French and German summaries ¼ p. each.]
J. agric. Engng Res., 1959, **4**: 229-42, bibl. 10.

Both theory and actual measurements show that, at a given wind speed, drift can best be reduced by keeping the nozzles low and using flat rather than cone nozzles, and by avoiding small drops in the spray. The latter was achieved most readily with low pressure in ground sprayers and by a combination of low pressure and modifications of the spray liquid when using aerial sprayers. [From author's summary. For part I see *H.A.*, 29: 2092j.]—N.I.A.E., Silsoe, Beds.

WEEDS AND WEED CONTROL.

General.

(*See also* 512.)

526. Canada, Ministry of Agriculture (Québec).
Manuel d'emploi des herbicides, 1959-1960. **(A handbook on the use of weedkillers, 1959-60)**, 1959, pp. 64.

Herbicidal materials, methods of application and recommendations for various crops and specific weeds are discussed.

527. Anderson, E. G.
Trends in weed control.
Rep. Que. Soc. Prot. Plants, 1958, 1959, **40**: 46-58, bibl. 23.

A review covering: herbicides; seed cleaning; grazing of weeds by geese, reindeer and sheep; biological control by insects; and research on wild oats (*Avena fatua*).

528. Mez, E.
Attuali orientamenti del diserbo chimico. **(Present trends in chemical weed control.)**
Frutticoltura, 1959, **21**: 535-40, illus.

A review, with special reference to destruction of trees and shrubs, weed control in nurseries of forest and ornamental trees, destruction of bracken, herbicides for vegetable crops, vineyards and orchards, control of wild oats (*Avena fatua*), and the interactions of herbicides and soils.

529. Serna Echeverri, H.
Malezas y su control. **(Weeds and their control.)**
Agric. trop. Bogotá, 1959, **15**: 84-9.

A review.

530. Beran, F., and Neururer, J.
Zur Frage der Nomenklatur und Charakteristik chemischer Herbizide. **(On the problem of nomenclature and characteristization of chemical herbicides.)** [English summary 13 lines.]
Z. PflKrankh., 1959, **66**: 520-34.

It is suggested that the system of decimal classification be applied to herbicides. Chemical designations, in German and English, common names (e.g. 2,4-D), structural formulae and code numbers are tabulated for 55 compounds.

531. Warren, G. F.
Possible uses of 2,5-dichloro-3-nitrobenzoic acid for weed control in horticultural crops.
Proc. 15th N. centr. Weed Control Conf., 1958, p. 8.

Replicated field experiments confirmed that carrots pumpkins and squashes are resistant to pre-emergence applications of 2,5-dichloro-3-nitrobenzoic acid, and strawberries to early post-emergence applications. Crabgrass (*Digitaria* spp.), pigweed (*Amaranthus* spp.) and purslane (*Portulaca oleracea*) were controlled by 4 lb./ac., but higher rates were needed to kill carpetweed (*Mollugo verticillata*).—From *Weed Abstr.*, **8**, No. 1437.

532. DOW AGROCHEMICALS LTD.
Dowpon, its contribution towards cleaner farming.
[*Publ.*] *Dow Agrochemicals Ltd., London*, 1959, pp. 44, bibl. 10, illus.

The properties, mode of action, methods of application and some other aspects of this systemic grass killer (active ingredient sodium salt of dalapon, 2,2-dichloropropionic acid) are described. Recommendations for its use are based on 3 years' trials in the United Kingdom by many organizations and farmers. They include applications for grass control under apples, black and red currants, gooseberries, raspberries, rhubarb, asparagus, narcissi and irises, and general method of controlling couch grass (*Agropyron repens*) and aquatic weeds.

533. WOLF, D. E., AND OTHERS.
Herbicidal properties of neburon.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 7-8.

A brief general account of neburon and its properties. It has proved to be a promising post-emergence herbicide in tomatoes at 2–6 lb./ac. and in strawberries at 2–4 lb./ac. Pre-emergence, it has given promising results in lima, green and snap beans and at 4–8 lb./ac. in carrots.—From *Weed Abstr.*, **8**, No. 1438.

534. BUSCH, J. W.
Niagara 4562. A post-emergent herbicide for use on carrots, celery and parsley.
Proc. 12th Mtg east. Sect. nat. Weed Cttee Canada, 1958, pp. 68-70.

Niagara 4562 (not yet identified) at 3–6 lb./ac. has given excellent weed control as a contact herbicide when applied to celery (seedbeds and 10–14 days after transplanting) and carrots (cotyledon stage to harvesting). No injury was caused to celery, but in carrots one of the two formulations tried caused slight temporary injury. The reaction of many weeds to the compound is indicated. Niagara 4512 has also been found promising in tomatoes and strawberries.—From *Weed Abstr.*, **8**, No. 1440.

535. NOZZOLILLO, C., AND HELSON, V. A.
Effects of petroleum oils on the oxygen uptake in respiration of parsnip and mustard.
Plant Physiol., 1959, **34**: 97-100, bibl. 10.

A Warburg respirometer was used to study the effects of petroleum oils on the respiration of parsnip and mustard leaves. A non-herbicidal, paraffinic oil, boiling range 204 to 260° C., increased the respiration of both parsnip and mustard with no visible injury to the plants. The herbicidal oils, petroleum naphtha, boiling range 149 to 204° C., a pure paraffin, *n*-dodecane and 300 p.p.m. of mercury in the paraffinic oil all caused the respiration of the resistant parsnip to increase with no visible injury to the plant, and the respiration of the susceptible mustard rapidly to decrease with the death of the plant. The pure aromatic, *p*-cymene, caused the respiration of both parsnip and mustard to cease by 2 hours after treatment and both plants were killed. [Authors' summary.]—Bot. and Plant Path. Div., Sci. Serv. Bldg, Ottawa.

536. FISHER, G. G., AND WILLIAMS, A. C.
Simazine and Atrazine as non-selective herbicides.
Proc. 12th Mtg west. Sect. nat. Weed Cttee Canada, 1958, 1959, pp. 16-19, illus.

Atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine) gave better total weed control than equal rates of simazine or monuron. The addition of amitrol, methoxy propazine (2-chloro-4,6-(isopropylamino)-s-triazine), dalapon or sodium chlorate improved the effect of simazine, but none of these mixtures, nor sodium chlorate with or without monuron or borax, appeared to be any better than low rates of Atrazine alone. There appears to have been little advantage in adding amitrol or dalapon to Atrazine.—*Weed Abstr.*, **8**, No. 1723.

537. WALKER, L. C., BECK, E., AND DUMBROFF, E.
Absorption rates of 2,4,5-T tagged with carbon-14.
For. Sci., 1959, **5**: 128-36, bibl. 18, illus.

Three brush-killer formulations compared in trials on *Quercus* and *Liquidambar* spp.

538. DAVIDSON, J. H., AND COULTER, L. L.
The use of invert emulsions to reduce spray drift and increase deposit of herbicides.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 24-5.

2,4-D (invert emulsion) was applied by air-blast sprayer at 350 p.s.i. travelling at 1 m.p.h. with the nozzle set to spray 50 ft. from the truck. Tomato plants were set at 5 ft. intervals from 40 to 230 ft. from the sprayer. Observations made 10 days after spraying showed that all plants between 40 and 65 ft. were severely affected, but that none beyond 75 ft. were affected. In another trial in which 2,4,5-T (acid invert emulsion) was applied in the normal way at 200 p.s.i. in a cross wind of 10–15 m.p.h. there was no injury to tomato plants growing 5–400 ft. from the area sprayed.—*Weed Abstr.*, **8**, No. 1572.

539. WOOTEN, O. B., AND HOLSTUN, J. T., JR.
Special equipment for chemical weed control.
Miss. Fm Res., 1959, **22**(5): 4, 5, 8, illus.

Low volume spraying machines for ditchbanks, orchards and row crops.

540. WALDRUM, J. E.
New approach to herbicide spraying.
Proc. 15th N. centr. Weed Control Conf., 1958, p. 27.

A brief description of a centrifugal sprayer designed primarily for the application of invert emulsion and suitable for both ground and aerial spraying.—*Weed Abstr.*, **8**, No. 1573.

Control of aquatic weeds.

541. CHANCELLOR, R. J.
An appraisal of the potential usefulness of chemicals for water weed control in Great Britain.
Rep. A.R.C. Unit exp. Agron., 1959, pp. 13.

This review, based on 400–500 reports, considers the phytotoxic and toxicological properties of 33 compounds which have been used for the control of aquatic weeds. There is a list of the most important British aquatic weeds.—*Weed Abstr.*, **8**, No. 1493.

542. ANON.
Kuron for aquatic weed control.
Down to Earth, 1959, **15**(1): 16.

Instructions are outlined for applying this 2,4,5-T product to control submerged, floating and emergent weeds in still water. Kuron is not suitable for use in flowing water.

Weed control in temperate fruit crops.

(*See also* 528, 531, 532, 573.)

543. LIEBSTER, G.
CMU-Schäden an Apfelbäumen. **(CMU injuries to apple trees.)**
ErwObstb., 1959, **1**: 134, illus.

The leaf spots described and illustrated resembled apple mosaic, but the symptoms disappeared in the following year.—Inst. Obstb., Weihenstephan Freising.

544. KRÜGER, H.
Bisherige Ergebnisse der Queckenbekämpfung mit Na-Trichloracetat (Na-TCA) im Obstbau. **(Results obtained so far on the control of couch grass in orchards by Na-TCA.)**
Dtsch. Gartenb., 1959, **6**: 151-3, illus.

In several years' trials stone fruits proved to be too sensitive to TCA, but pome fruits tolerated amounts necessary to control couch grass. Applications recommended for pome fruits in the early spring are 30–40 kg./ha. in orchards and 20–30 kg./ha. in nurseries. The herbicide can either be sprayed before bud burst (in 600 l. water/ha.), or it can be applied to the soil mixed with sulphate of ammonia.—ForschLab. SchädlBekämpf. VEB elektrochem. Komb. Bitterfeld.

545. WHITE, R. G.
Commercial weed control practices in lowbush blueberry and strawberry fields and future objectives of research workers in this field.
Proc. 12th Mtg east. Sect. nat. Weed Cttee Canada, 1958, p. 10, bibl. 9.

A brief review including mention of (1) the control of sweet fern (*Comptonia peregrina*) and lambkill (*Kalmia angustifolia*) with 2,4-D and/or 2,4,5-T (amines) in blueberries; (2) the use in blueberries of a contact herbicide applicator, by means of which rolls of herbicide-saturated cloth attached to revolving drums are passed over the weeds but are adjusted so as not to touch the blueberries; (3) spot spraying in blueberries of woody weeds including bayberry (*Myrica pennsylvanica*); and (4) low fertilizer application (200–300 lb./ac.) for weed control in strawberries, which resulted in lower yields but also in reduced costs.—*Weed Abstr.*, **8**, No. 1451.

546. PÁTEK, J., AND BLAHA, J.
Příspěvek k poznání vývojové dynamiky viničních plevelů. **(A contribution to the knowledge of the development of weeds in vineyards.)** [Russian, French and German summaries $\frac{3}{4}$ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 437-46, bibl. 2.

Examples of typical vineyard weed floras and seasonal changes in their composition are recorded. Cultivation alone can eradicate only a few weed species, but frequent shallow cultivation combined with the use of herbicides such as monuron and simazine shows promise.

547. PEARCE, G. A.
Weed control in vineyards.
J. Agric. W. Aust., 1959, **8**: 217-20, illus.

The application, within a week of the first winter rains, of 4 lb. of CMU or 8 lb. of amino triazole per acre in a 2-ft. strip along each row gave complete control of the common annual weeds for 14–16 weeks in preliminary trials in 1958.

548. WEAVER, R. J., AND MCCUNE, S. B.
Test for activity of plant growth-regulators on grapes.
Bot. Gaz., 1959, **120**: 166-70, bibl. 4, illus.

Methods for testing the activity of growth-regulating herbicides (2,4-D, 4-MCPB and 3,4-D) on grapes were studied. When drops containing 0·1–5 μg. of different growth-regulators were placed on different apexes of young Tokay shoots, subsequent growth was highly variable within each treatment. The apical 6 inches of Black Monukka shoots were sprayed with 2,4-D in the range of 1–750 p.p.m. A ring of India ink was applied on the shoots 2 inches below the apexes as a marker. After 8 days the length, fresh and dry weights of stems and leaf blades separately and the total weight of shoots were determined for the growth occurring after spraying. The degree of suppression of the total fresh weight of shoots was judged to be the best criterion for use in this bio-assay. Similar results were obtained with Thompson Seedless. The bio-assay was utilized to determine the relative toxicity of various regulators and to test differences in varietal sensitivity. There was an indication that 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) at 25 p.p.m. was less toxic than 2,4-D or 4-chlorophenoxyacetic acid (4-CPA) when tested on Zinfandel. Thompson Seedless proved to be more sensitive than Delaware to 2,4-D at 25 or 50 p.p.m. [From authors' summary.]—Univ. Calif., Davis.

Weed control in ornamentals.

(*See also* 528, 532, 1011, 1012.)

549. Corns, W. G.
Research reports. [Weed control in] flowers.
Proc. 15th N. centr. Weed Control Conf., 1958, p. 124.

Applications of neburon at 5 lb./ac. at the flowering stage caused no damage to ageratum, aster, marigold, nemesia, lilies or delphinium, slight damage to pansy, salpiglossis and zinnia and severe damage to phlox. Lilies and delphinium were also uninjured at 8 lb./ac.—*Weed Abstr.*, **8**, No. 1444.

550. Grigsby, B. H.
Nursery weed control practices.
Nurs. Notes Mich. St. **17**, 1958, pp. 4.

The author gives information concerning soil sterilants (methyl bromide, SMDC and DMTT) and general recommendations for weed control in nursery rows, in established perennials and woody species, in ground cover plantings and in turf.—From *Weed Abstr.*, **8**, No. 1447.

551. Anon.
Research reports. [Weed control in] ornamental and forest nurseries.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 124-5.

Six reports were received. CDAA, 2-chloro-4-ethylamino-6-diethylamino-s-triazine (Trietazine) and EPTC gave rather better weed control and slightly more crop injury when applied 2 days after transplanting tobacco than when applied 1 day before transplanting. Three-year-old *Forsythia intermedia spectabilis* and *Malus hopa* were uninjured by late summer applications of CDAA at 8 lb./ac. and/or 2,4-DES at 8 lb./ac. Two-year-old *Lonicera tatarica rubra* and *Cercis canadensis* were injured by simazine at 3 lb./ac. Multiflora rose was injured only by treatments containing dalapon.—From *Weed Abstr.*, **8**, No. 1448.

552. Ries, S. K., Grigsby, B. H., and Davidson, H.
The evaluation of herbicides for several species of ornamentals.
Proc. 15th N. centr. Weed Control Conf., 1958, p. 7.

Autumn applications of simazine appear to be promising for weed control in *Taxus*, juniper, tulip and *Hemerocallis*; there was severe injury to forsythia, pyracantha, euonymus and Baltic ivy. Dalapon injured *Pachysandra* and *Taxus.*—*Weed Abstr.*, **8**, No. 1445.

553. Kunze, H.-D.
Arbeitserleichterung durch chemische Unkrautbekämpfung bei Maiblumen. (**Reducing labour by chemical weed control in lilies-of-the-valley.)**
Gartenwelt, 1959, **59**: 256-7, illus.

From the results of a small-scale experiment the following CIPC treatment is recommended for lilies-of-the-valley: 1st spray after planting in the autumn or early spring; 2nd spray after soil cultivation at the end of June or the beginning of July; 3rd spray after soil cultivation and weeding in the middle of October; 4th spray after soil cultivation and weeding in June/July of the second year. The plants did not suffer any injury.

554. van der Graaf, A. J., and v.d. Laar, H.
Chemische onkruidbestrijding. (**Chemical weed control.)**
Jaarb. Proefst. Boomkw. Boskoop, 1958, pp. 78-85.

Seedbeds: A pre-emergence spray of Shell W gave favourable results with a large number of broad-leaved and coniferous species. PCP in oil was also useful, but could be phytotoxic to shallow-sown seeds. *Pinus sylvestris:* Applications of Shell W (600–800 l./ha.) are recommended when the seedlings are a few weeks old, and again 3–4 weeks later. *Seedling conifers:* A spring application of Shell W, CIPC, simazine, or Shell W + simazine before shoot growth began was effective for *Picea abies.* Weeds in *Thuja* spp. were controlled by Shell W, DNOC and simazine. *Transplanted conifers:* Shell W was the best for weed control in *Picea abies*, and simazine gave the best results with *Pinus sylvestris* and *P. nigra corsicana.* For *Chamaecyparis* CIPC was the best material, and both CIPC and simazine were effective for larch. *Deciduous woody plants:* CIPC, DNOC, DNOC + CIPC, simazine, and DNOC + simazine gave good weed control in plots of winter cuttings and dormant plants.

555. CARTIER, R. D., AND COITEUX, F.
Le contrôle des mauvaises herbes dans les pépinières sylvicoles. **(Weed control in tree nurseries.)**
Rep. Que. Soc. Prot. Plants, 1958, 1959, **40**: 81-3.

Premerge, at 1 gal. of the commercial product per acre, gave highly satisfactory control of *Stellaria media, Chenopodium album, Amaranthus retroflexus, Capsella bursa-pastoris*, dandelion (*Taraxacum officinale*) and nutgrass (*Cyperus esculentus*), in nurseries of *Pinus resinosa* and *Picea marina.* Results were almost as good with 8 lb. of EPTC per acre, followed in effectiveness by CIPC (liquid) at 4 lb. and dalapon at 8 lb. per acre. The granular form of CIPC (5%) at 160 lb. per acre was slightly less effective than the liquid. Thinness of many of the stands was attributed to wind erosion rather than to herbicide injury.

556. LEHTO, T. V.
New weed killer tested.
Amer. Nurserym., 1959, **109**(9): 14, illus.

A pre-sowing application of 3,5-dimethyltetrahydro-1, 3–5, 2H thiadiazine-2-thione gave excellent weed control in seed beds of white pine, and also controlled fungi causing damping-off and root rot. Seedling counts in treated beds were 3 times higher than those in untreated seed beds.

557. CHADWICK, L. C.
Controlling spring weed growth in *Taxus* by fall applications of herbicides.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 6-7.

November applications of simazine at 2 and 4 lb./ac. were still giving 58 and 74% weed control respectively 8 months later without having injured the yew trees.—From *Weed Abstr.*, **8**, No. 1450.

558. WOSTMANN, E.
Unkrautbekämpfungsversuche in *Erica gracilis.* **(Weed control experiments in *Erica gracilis.*)**
Gesunde Pflanze, 1959, **11**(7): 139-41.

Four days before setting out pots of *E. gracilis* the land was treated with (1) monuron at 4 kg./ha., (2) CIPC, (3) urea + carbamate and (4) simazine at 2 and 4 kg./ha. *Galinsoga parviflora* was controlled by (1) and (4), *Chenopodium album* and *Poa annua* by all compounds, *Stellaria media* by (1), (2) and (4) and moderately well by (3), *Urtica urens* and *Capsella bursa-pastoris* by (1), (2) and (4). No injury was caused to *Erica* even though the roots had grown out of the bottom of the pots.—From *Weed Abstr.*, **8**, No. 1634.

559. MARCHAL, J.
Sering. Onkruidbestrijding. **(Weed control in lilacs.)**
Jversl. Proefst. Bloem. Aalsmeer, 1958, p. 100.

Weeds in the seedling stage were most successfully controlled by simazine, but larger weeds (1 cm. high) were best controlled by PCP-oil. Results with a flame gun were unsatisfactory because of the high proportion of grass.

Weed control in tobacco.

560. CHAPPELL, W. E., LAPRADE, J. L., AND MCCLAUGHERTY, F.
Weed control in tobacco seed beds.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, p. 120, from *CORESTA Inf. Bull.*, 1958, No. 4, Abstr. 1,942.

Good results were obtained by drenching with Vapam, with allyl alcohol plus ethylene dibromide, or with allyl alcohol plus diethylene dibromide. Drenching should be done at least three weeks before sowing. [See also *H.A.*, 28: 1347.]

561. STROUBE, E. W., AND FREEMAN, J. F.
Soil treatment with methyl bromide applied in the vaporized and liquid forms for controlling weeds in tobacco beds.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 9-10.

When methyl bromide at 1 lb./100 sq. ft. was applied as a vapour under a plastic cover for periods of 3, 6, 12 and 24 hours, 98–99% weed control resulted. An application of 0·5 lb. for 12 hours only gave 95·5% control. Where unvapourized methyl bromide was allowed to evaporate from a tray and left under a seal for 24 and 48 hours, weed control was 98·6 and 98·5%, respectively. Tobacco sown 1 week later made equally good growth on all the treated plots.—*Weed Abstr.*, **8**, No. 1453.

562. TOŠIĆ, L.
Dejstvo nekih hemiskih preparata na *Orobanche ramosa.* **(The effect of certain chemicals on *Orobanche ramosa*).** [English summary $\frac{1}{4}$ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 231-4, bibl. 5.

The effective control agents PCP, CIPC, DNBP, IPC and copper sulphate were all phytotoxic to tobacco.

Weed control in tropical and subtropical crops.

(*See also* 1138.)

563. DAY, B. E., AND MCCARTY, C. D.
Weed control methods for use in avocado culture.
Yearb. Calif. Avoc. Soc., 1959, **43**: 75-8, illus.

The advantages and disadvantages of weed control in avocado orchards by mowing, tillage and herbicides are discussed, and methods used for the control of perennial grasses, perennial broad-leaved weeds and annual weeds are outlined. As herbicides weed oils, oil-water emulsions, oils fortified with dinitro or pentachlorophenol, monuron and 2,4-D acid or amine are recommended. Dalapon and amino triazole have also proved very effective, and the triazine compounds have shown promise. In newly planted orchards, covering the ground around the young trees with black plastic greatly aided weed control.—Univ. Calif., Riverside.

564. WALLIS, J. A. N.
Herbicides in Kenya coffee. IV.
Pest. Abstr. News Summ., Sect. C, 1959, **5**: 40-58, bibl. 3.

A description is given of several trials on the control of *Digitaria scalarum*, the results of which have led to the following recommendations: Before rain is expected slash all the tall and dead grass to 6 in. from the ground and remove the trash. Spray immediately with a 1% w./w. solution of dalapon in water at not more than 7 lb./ac. (5 lb./ac. is advised for safety). The sprayed area should be left undisturbed for at least 2 months when it may be cultivated to encourage sprouting. At maximum sprout emergence a second dalapon treatment, at the same rate as the first, should be applied. When applying the herbicide the ground should be sprayed right up to the coffee trees, without, however, wetting their stems or leaves. Pot trials suggested that this grass may produce a root exudate which restricts the growth of coffee seedlings and also, conceivably, that dalapon may encourage the growth of coffee. [For earlier work see *H.A.*, 29: 356.]

565. RUBBER RESEARCH INSTITUTE OF MALAYA.
Control of weeds on Malayan rubber estates.
Plant. Bull., R.R.I.M., 1959, No. 44, pp. 100-16, bibl. 9, illus.

The weed killers sodium arsenite, sodium chlorate, various oils, TCA, dalapon, ATA, 2,4-D, 2,4,5-T, and Floroxone are described. A short account is given of wetting agents and methods of preventing the selected agents from damaging the leaves and roots of the rubber trees. Treatments are recommended for individual weeds. Dalapon at 15 lb. per 100 gal. per acre with a wetting agent is advised for the control of lalang (*Imperata cylindrica*) and at 8–10 lb. for most other grasses, except *Paspalum conjugatum* for which ATA should be used starting with 10 lb. per 100 gal. These two herbicides are also suggested for sedge (*Scleria multifoliata*) control. Fernoxone (a 2,4-D product) and Floroxone (2,4-D + 2,4,5-T) are recommended at 5 lb. and 4 pints per 100 gal. respectively for the control of most weeds other than grasses. Routine maintenance of cleared strips is best carried out with 2½% sodium chlorate or with a mixture of dalapon and Fernoxone used at strengths dependent on the amount of grass present. All recommendations are set out in tabular form.

Weed control in turf.

566. ANON.
Research reports. Weed control in turf.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 118-19.

Five reports are discussed. July applications of 2,4,5-TP (ester) at 2 and 3 lb./ac. gave 100% control of the plantains *Plantago rugelii* and *P. major* and white clover (*Trifolium repens*) without having any effect on knotweed (*Polygonum aviculare*) or bluegrass. 2,4,5-TP applied in July or October killed ground ivy (*Glechoma hederacea*), whereas 2,4-D was only effective in October. Chickweed (*Stellaria media*) was killed by 2,4,5-TP applied at 1 and 2 lb./ac. in April. Neburon at 4 lb./ac. proved to be more selective for the control of chickweed in Kentucky bluegrass than diquat or sodium arsenite; neburon also caused no injury to creeping red fescue. Phenyl-mercuric-8-hydroxyquinolinate 3 × 0·2 oz./1,000 sq. ft. gave much poorer control of crabgrass (*Digitaria* spp.) than disodium methyl arsonate 3–4 × 1·05 oz. NPA appears to be much less effective for the control of crabgrass in Kentucky bluegrass than chlordane or lead arsenate.—From *Weed Abstr.*, **8**, No. 1441.

567. EGLEY, G. H., AND ROGERS, B. J.
Some effects of chlordane on germination and growth of turf grasses.
Proc. 15th N. centr. Weed Control Conf., 1958, p. 35.

The survival of 11 species of turf grasses from pre-emergence applications of 65 and 85 lb./ac. of chlordane varied from 10 to 100%. Post-emergence applications were not particularly toxic to any species if well established.—From *Weed Abstr.*, **8**, No. 1442.

568. SCHMIDT, R. E., AND MUSSER, H. B.
Some effects of 2,4-D on turf grass seedlings.
J. U.S. Golf Ass. and Turf Mgmt, 1958, **11**(6): 29-32.

2,4-D (diethanolamine) at 0·5 and 1 lb. a.e./ac. was applied to Kentucky bluegrass, creeping red fescue and colonial bentgrass seedlings, 2, 4, 6, 8 and 10 weeks old, in spring, summer and autumn. Both rates seriously reduced the density of the 2-week-old seedlings of all 3 species at all seasons. In general, bentgrass was the most susceptible and bluegrass the least; injury decreased as the age of the plants at the time of treatment increased. —From *Weed Abstr.*, **8**, No. 1636.

569. TREVETT, M. F.
Kill chickweed in lawns with Silvex.
Me Fm Res., 1959, **7**(1): 16.

A ½-oz. application of 2,4,5-TP per 1,000 sq. ft., applied in late August or early September, controls annual and perennial chickweed [*Stellaria* spp.]

without affecting most lawn grasses, but it may injure bent and other stoloniferous grasses.

570. GRIGSBY, B. H.
Control of chickweed in turf.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 37-8.

For the control of common chickweed (*Stellaria media*) in the spring, MCPA at 2 lb./ac. or disodium monomethylarsonate are recommended; for autumn use MCPA is recommended, or if resowing is to be carried out, Stoddard Solvent; dinoseb and ethyl xanthogen disulphide have too long a residual effect. Neburon has given good results but should not be used on turf less than 1-year-old. For mouse ear chickweed (*Cerastium vulgatum*) 2,4,5-TP at 2 lb./ac. in the spring or autumn is recommended.—*Weed Abstr.*, **8**, No. 1524.

571. HERRON, J. W.
Control of nimblewill in bluegrass turf.
Proc. 15th N. centr. Weed Control Conf., 1958, p. 37.

If applied when the weed was making active growth, MH at 7 lb./ac. gave over 90% control of nimblewill (*Muhlenbergia schreberi*) without injury to the Kentucky bluegrass in which it was growing. Potassium cyanate, dinoseb and TCA proved to be insufficiently selective.—*Weed Abstr.*, **8**, No. 1522.

572. GOETZE, N. R.
***Poa annua* control in turf.**
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 36-7.

Neburon at 4 lb./ac. has satisfactorily controlled *Poa annua* in bluegrass lawns but it damaged fine-leaf fescues and bentgrass; it is most effective when applied pre-emergence but is also active on young plants. Water-soluble inorganic arsenicals have also given promising results. Although giving promising results in preliminary trials, the following compounds are not now considered satisfactory: CDAA, 2,3,6-TBA and *p,p*-dibutyl-N,N-diisopropylphosphinic amide.—*Weed Abstr.*, **8**, No. 1523.

Weed control in vegetables.

(*See also* 528, 531, 532, 677.)

573. ANON.
Research reports. Weed control in horticultural crops. Vegetables.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 119-24.

The 21 reports summarized under this heading deal with herbicidal applications in onions, peas, lettuces, beetroot, asparagus, carrots, bush beans, cucumbers, tomatoes, cauliflowers, peppers [capsicums], strawberries and raspberries.—From *Weed Abstr.*, **8**, No. 1439.

574. SCHOENEMANN, J. A., BUCHHOLTZ, K. P., AND HOLM, L. G.
Chemical weed control recommendations for vegetable crops 1959.
Spec. Circ. Univ. Wis. Ext. Serv. **55**, 1959, 1 folded sheet.

In a convenient tabulated form.

575. ORTH, H.
Untersuchungen über Anwendung von Herbiziden im Gemüsebau. **(Studies on the application of herbicides in vegetable crops.)**
Reprinted from *Wiss. Z. Univ. Halle, Math.-Nat.*, 1958, **8**: 52-3.

An abridged review.

576. SHANE, W. A.
Asparagus. Quack grass control.
Amer. Veg. Gr, 1959, 7(6): 22.

Two applications of a spray containing 1 oz. Dowpon and ½ oz. 2,4-D ester in 1 gal. of water, combined with shallow, inter-row cultivations gave excellent control of quack grass in asparagus beds.—Coberg, Ontario.

577. STEPHEN, R. C.
Spurrey control in brassica crops.
N.Z. J. Agric., 1959, **99**: 115-17, illus.

In 1956-57 trials control of spurrey (*Spergula arvensis*) was obtained in kale with CIPC and propham as pre-emergence sprays at 1 lb./acre, the latter damaging the crop but showing a net benefit. In 1957–58 complete control was obtained with CIPC at 1 and 2 lb. per acre, with control of sheep's sorrel (*Rumex acetosa*) in addition. In some districts of the North Island of New Zealand, in which soil temperatures were higher, similar trials gave inconclusive results for CIPC.—Dep. Agric., Balclutha.

578. DETROUX, L., DE FAESTRAETS, L., AND LAVALLEYE, M.
Le désherbage chimique des cultures de haricots (*Phaseolus vulgaris*). III. Essais précisant les conditions d'emploi du néburon et simazin. **(Chemical weed control in beans (*Phaseolus vulgaris*). III. Experiments defining the conditions for the use of neburon and simazine.)**
Bull. Inst. agron. Gembloux, 1959, **15**: 108-20, bibl. 4.

For neburon a rate of 1·8–2·2 kg. of active material per ha. was preferable to 1·1 kg., and gave better results than DNBP at 810 g./ha. or mechanical weeding. Simazine gave good results at 0·25–0·5 kg. of active material per ha. without the slight crop injury previously recorded for the highest rate. In all cases the yields benefited by one or two mechanical weedings between emergence and harvesting. Simazine was less safe than neburon, the difference in their toxicity being greater with beans than with peas. [For previous work see *H.A.*, 28: 2498.]

579. Detroux, L., de Faestraets, L., and Lavalleye, M.
Essais de désherbage chimique des cultures de pois (*Pisum sativum*). II. Essais précisant les conditions d'emploi du néburon et du simazin. (**Chemical weed-control experiments with peas *(Pisum sativum)*. II. Experiments defining the conditions for the use of neburon and simazine.**)
Parasitica, 1959, **15**: 89-107, bibl. 2.

The superiority of neburon and simazine to DNBP and MCPB for weed control in peas was confirmed, particularly with regard to grasses, which showed little resistance to simazine. On medium textured soils simazine can be applied at 0·25–0·375 kg./ha., but at higher rates the peas may be injured. Neburon can be used on these soils at 1·8–2·2 kg./ha., and no crop injury has been observed after applying 4·4 kg./ha. In contrast to the previous year's results, pea yields were slightly improved by hoeing after applying the herbicides. [For previous work see *H.A.*, 28: 1365.]—Stat. Phytopharm., Gembloux, and Inst. nat. Amél. Conserv. Lég., Wesembeek-Ophem.

580. Rademacher, B.
Einige Beispiele für Kettenwirkungen nach Anwendung von Herbiziden. (**Some examples of chain effects following herbicide application.**) [English summary 13 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 155-6.

Severe damage to a pea crop by a DNBP application was followed by a serious infestation of *Ascochyta pinodella*. A pre-emergence application of TCA renders peas more susceptible to DNBP, since the former affects the waxy leaf surface.—Inst. PflSch., Landw. Hochsch., Hohenheim.

581. Rakitin, Ju. V., and Potapova, A. D.
Penetration of herbicides into plants and their influence on phosphorus uptake. [Russian.]
Fiziol. Rast., 1959, **6**: 614-16, bibl. 8.

Pea seeds treated with labelled 4-iodophenoxyacetic acid contained a high concentration of this compound. A spray application of CIPC or 2,4-D (sodium) at first decreased, but by the fifth day increased, the P^{32} content of bean leaves. The additive OP-7 depressed P^{32} uptake.

582. Quaglia, A.
Prove di diserbo chimico delle colture di cipolla. (**Herbicide trials on onion crops.**)
Rev. Ortoflorofruttic. ital., 1959, **43**: 255-63, bibl. 6, illus.

Neburon, 2,4-DES and CIPC sprays were applied at 3 rates when the onions had produced the third leaf and a fortnight or a month later. The best results were given by the 95% sodium salt of 2,4-DES at 6 kg. and by 25% CIPC at 20 l. per ha., applied when the onions had produced the third leaf. The crop sustained some injury, however, and rates of 3 kg. and 10 l. respectively are consequently recommended. The responses of 19 weeds are tabulated.

583. Pearce, G. A.
Weed research. 3. Weed control in onions.
J. Agric. W. Aust., 1959, **8**: 341-4, illus.

Trials have shown that CIPC at 4 lb. per acre is effective for weed elimination in onions. The herbicide can be applied to the seed bed in heavier soils, but not to sandy soils until the plants reach the "hook" stage. Transplants or sets can be treated immediately after planting.

584. Laliberté, J.
Essais d'herbicides dans les cultures d'oignons. (**Herbicide trials in onion crops.**)
Rep. Que. Soc. Prot. Plants, 1958, 1959, **40**: 143-7, bibl. 11.

The effectiveness of monuron against weeds was more than outweighed by its injurious effect on the onion crop. Cyanamide (liquid) at 5 gal. per 40 gal. of water per acre, applied before and after emergence, gave very promising results, proving superior to a solution of 75 lb. of solid cyanamide + 10 lb. of potassium cyanate in 80 gal., and also to 5 lb. of CIPC in 50 gal., similarly applied. However, until further tests have established the safety of cyanamide, the slightly more costly CIPC treatment is recommended for onions in Quebec.

585. Corrales Macedo, A.
Empleo de hierbicidas en el cultivo de la cebolla. (**The use of herbicides in onion growing.**)
Bol. trim. Exp. agropec. Lima, 1959, **8**(1): 5-10.

CIPC applied at 8 qts/acre in 5–100 gal. of water before emergence seriously checked the germination of onion seeds, but the same treatment applied to a 70-day-old crop gave excellent results in controlling weeds, with no sign of crop injury. Weed control with monuron, at low, medium and high concentrations, was considerably less satisfactory, and established plants suffered more injury than from CIPC, but monuron was the less harmful pre-emergence herbicide. Johnson grass (*Sorghum halepense*) was little checked by CIPC or hand weeding, and only moderately controlled by monuron. Yields were highest on the CIPC plots, but bulb quality was slightly better on hand-weeded plots. The monuron low- and medium-concentration treatments were the most economic.

586. Anon.
Onkruiden en ziekten in uien en sjalotten. (**Weeds and diseases in onions and shallots.**)
Meded. Sticht. Ned. Uien-Fed., **3,** 1959, pp. not stated.

Detailed instructions are given on the use of emulsifiable PCP oils, sulphuric acid and CIPC for weed control in seeded onions, planted onions and shallots, and on the use of CIPC and simazine in onions grown from seed.—From *Weed Abstr.*, **8**. No. 1630.

587. Verlaat, J. G.
Onkruidbestrijding in plantprei. **(Weed control in transplanted leeks.)**
Groent. Fruit, 1959, **14**(51): 1533-4.

Transplanted leeks are very susceptible to weed competition but are tolerant of DNC, dinoseb and CIPC. DNC at 4 kg./ha. may be applied shortly after transplanting though leaves with drooping tips might suffer local injury. Dinoseb is used at 10 l./ha. (13·5%). CIPC may be applied shortly after transplanting to a weed-free soil. High-volume application is recommended to improve penetration of the product into the soil and prevent vapour drift to neighbouring crops. Rain after application improves results, but spraying should be done on a dry and hardened crop. Earthing up leeks may reduce the residual activity of the chemical. On heavy soils, inclined to crusting, simazine and monuron are not recommended; however, good results have been obtained on other soils.—*Weed Abstr.*, **8**, No. 1629.

588. Immel, R., and Linden, G.
Über den Einfluss extrem hoher Niederschläge auf die Auswirkung einer CIPC-Behandlung in Zwiebeln und Möhren. **(The influence of extremely high rainfall on the effect of CIPC on onions and carrots.)**
Paper read at *3rd German Conf. on Weed Biology and Control*, 1959, pp. 3.

In 1958, when the rainfall after treatment was 3 times as great as in the preceding 4 years, yields and stands of carrots and onions were lower after treatment with CIPC than in previous years. In greenhouse tests CIPC under comparable conditions did not give confirmatory results. Very low volume applications of CIPC were more selective in onions than normal rates.—*Weed Abstr.*, **8**, No. 1631.

589. Žukova, P. S.
The use of herbicides in vegetable growing. [Russian.]
Sad i Ogorod, 1959, No. 5, pp. 21-2.

For weed control in carrots CIPC, tractor kerosene and calcium cyanamide, in beetroots calcium cyanamide, and in onions CIPC and calcium cyanamide showed the most promise.

590. Darhoose, S.
Weed control in carrots.
Agric. Res. Rev., Egypt, 1958, **36**: 515-27, illus.

The chief weeds present in two trials carried out in Egypt were grasses (particularly *Cynodon dactylon*), *Chenopodium morale* and *Portulaca aegyptica*. The first proved resistant to both Crag (MCPES) at 1–2 kg./acre and Tropotox (MCPB) at ¼–1½ lb./acre, and the others to Crag. At the lowest rate Tropotox was practically harmless to the carrot crop and gave satisfactory control of broad-leaved weeds, but at higher rates crop injury was considerable. Neither product is recommended for weed control in carrots.

591. Trinčenko, I. V.
A new method of controlling weeds in carrots. [Russian.]
Sad i Ogorod, 1959, No. 6, pp. 11-13, illus.

By sowing the carrot seeds 5 cm. deep followed, 8–15 days later but before emergence, by cultivation to a depth of 1·5–2·0 cm.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 13, 37, 445, 970, 1460, 1461, 1478).

592. Verbesselt, R.
L'évolution de la culture maraîchère depuis 25 ans. **(The development of [Belgian] market gardening during the last 25 years.)**
Bull. hort. Liège, 1959, **14**: 307-10.

Including lists of new vegetable and strawberry varieties.

593. Hahn, P., and Mildner, E.
Neue Gemüsesorten, die 1959 in die Sortenliste der Deutschen Demokratischen Republik aufgenommen wurden. **(New vegetable varieties incorporated in the variety list of the German Democratic Republic in 1959.)**
Dtsch. Gartenb., 1959, **6**: 185-9, illus.

See also *H.A.*, 29: 384.

594. Lamm, R., Hintze, S., and Åvall, H.
Klassificerande sort- och stamförsök med köksväxter 1955–1958. **(Classification trials with vegetable varieties and strains 1955-1958.)** [English and Esperanto summaries 1¼ and ¾ pp.]
Medd. Trädgårdsförs. Alnarp **121**, 1959, pp. 22.

Varieties of pea, cauliflower, cabbage, carrot, radish and spinach.

595. Crang, A., Filer, E., and Leach, M.
A comparison of some varieties of vegetables preserved by canning and by freezing. Progress report VI.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 175-9, bibl. 2.

This report gives the quality assessment and wastage during preparation of 10 varieties of broad beans preserved by freezing, and of 17 varieties of French beans, 5 of carrots, 8 of peas, and 4 of spinach preserved by canning and by freezing. Comments are made on 24 individual varieties that have been tested for 3 seasons. [Authors' summary. For previous report see *H.A.*, 28: 391.]

596. Quackenbush, F. W., and Carter, A. S.
Inspection of agricultural and vegetable seeds.
Insp. Rep. Purdue Univ. agric. Exp. Stat. **14**, 1959, pp. 64.

Includes the percentage germination for vegetable seeds under the new Indiana Seed Law of 1957.

597. Messeri, P.
Sviluppo vegetativo e maturità riproduttiva in piante ottenute da semi irradiati con raggi X. **(Vegetative growth and reproductive maturity in plants raised from seeds irradiated with X-rays.)**
Nuovo G. bot. ital., 1957, **64**: 261-5, bibl. 24, [received 1959].

Dry seeds of lettuce, spinach, pea and broad bean were given X-ray treatment at 600, 1,200 and 1,800 r, and the higher dosages were also applied to seeds which had been soaked for 24 hours. The treatments had little or no effect on the germination, vegetative growth or flowering date of lettuce. Germination of spinach seeds was accelerated, and plant growth stimulated, by dry treatment at 600 and 1,200 r, but both activities were markedly depressed after exposing dry seeds to 1,800 r and soaked seeds to 1,200 r. The normal growth rhythm of alternating flushes and rests in spinach was modified, the rest periods being shortened or suppressed by the 2 lower doses, and lengthened by the highest dose. The date of flowering was not affected. In peas there was no response in germination, and growth responses were similar to, but mostly much weaker than, those of spinach. Resting periods, however, were both delayed and lengthened, root tips became necrotic, and leaves developed spots and curled margins, when dry seeds had received 1,800 r and soaked seeds 1,200 r. Broad beans were exceptional in showing reduced growth at 600 r, but they responded to the other treatments in a similar way to spinach. In all 4 species, most particularly in spinach, soaking the seeds stimulated germination and growth, and enhanced the effects of irradiation at 1,200 r.

598. Kružilin, A. S., and Švedskaja, Z. M.
Accelerated seed production in new varieties and hybrids of biennials by means of grafting. [Russian, with English summary 5 lines.]
Fiziol. Rast., 1959, **6**: 625-6, bibl. 2.

The method consists of grafting biennial seedlings either on to annuals, e.g. cabbage on rape or mustard, or on to seed plants of the same species, e.g. beet and carrot, thereby obtaining seed during the first year.

599. Michaelides, R. C.
A review of seed production work in Cyprus.
Countryman, Nicosia, June, 1959, pp. 6-9, illus.

Particularly in relation to quality, and including vegetables and ornamentals.

600. Krummel, N. J.
Ensayos preliminares de fertilización en distintas especies horticolas. **(Preliminary experiments on manuring different vegetables.)**
Idia, 1959, No. 137, pp. 13-23, bibl. 8, illus.

The crops were turnips, lettuces and broad beans, and the fertilizer treatments provided either guano alone, or horse manure plus inorganic NPK, NP or PK. The soil was a fertile sandy loam. The best results with all 3 crops were from a commercial 11 : 40 : 9·5 mixture in conjunction with horse manure, the response being most marked in lettuces.

601. Geissler, T.
Die Anwendbarkeit der Blattdüngung im Gemüsebau. **(On the foliar nutrition of vegetables.)**
Dtsch. Gartenb., 1959, **6**: 158-60, illus.

This is the preliminary report of a trial, in the course of which foliar applications of NPK to 16 kinds of container-grown vegetables have been studied. For various reasons the technique is likely to encounter difficulties in practice, but its use is envisaged for two special purposes: (1) the application of P_2O_5 as a form of starter solution on soils where P is not readily available, and (2) as a top dressing of N during the later stages of development.—Inst. Gartenb. Grossbeeren.

602. Baumann, E.
Zur Verwertung von Müll und Klärschlamm im Gemüsebau. **(On the utilization of town waste and sewage sludge in vegetable growing.)**
Dtsch. Gartenb., 1959, **6**: 217-18, bibl. 4.

The response of different container-grown vegetables to composts from town wastes and sewage sludge is illustrated by graphs. On the whole, these materials had a beneficial effect on cabbage, turnip, beet, spinach, rhubarb and potato, but depressed yields in carrot, lettuce, bean, cucumber and especially in onion.—Inst. Gemüseb. Grossbeeren.

603. Mosolov, I. V., and Mosolova, L. V.
The effect of gibberellin on the growth and development of agricultural crops. [Russian, with English summary ⅓ p.]
Izv. Akad. Nauk. S.S.S.R., Ser. biol., 1959, No. 4, pp. 577-89, bibl. 6, illus.

Lettuce, dill, celeriac, parsley, onion and garlic were among the plants sprayed with GA at 50–100 mg./l. The treatment increased the uptake and assimilation of nutrients with consequent increases in their contents in the tissues. For the best results, therefore, the use of GA should be combined with a high level of nutrition. GA was also shown to increase the oxidation-reduction processes and sugar synthesis in the plants.

604. Janes, B. E., and Drinkwater, W. O.
Irrigation studies on vegetables in Connecticut.
Bull. Conn. agric. Exp. Stat. **338**, 1959, pp. 82, bibl. 39, illus.

The effects of irrigation on yield, quality and soil moisture extraction patterns of cabbages, beans, tomatoes, onions, lettuces and maize were studied from 1950 to 1954. The following 3 irrigation treatments were compared with a no-irrigation treatment: heavy-and-frequent irrigation (0·5 inch applied every 4 or 5 rainless days); light-and-frequent irrigation (0·25 inch applied every 4 or 5 rainless days); heavy-and-infrequent irrigation (1·0 inch applied every 10 to 12 rainless days). The experimental soil was a fine sandy loam. Annual variations in climate produced marked differences in the year to year response to irrigation. A prolonged condition of low soil moisture occurring at any time in the growth of cabbages reduced the yield. Dry conditions were most harmful during the latter part of the growing season. Of the 6 crops studied, beans were the most susceptible to injury from moisture stress. The greatest injury to beans from lack of moisture occurred in later stages of growth, but lack of moisture at any time reduced the yield. Irrigation was not beneficial to yields of tomatoes except in 1953, a dry year, when it increased fruit size. Tomatoes absorbed water first from the top soil and then from greater depths. Accurate control of soil moisture was necessary to obtain the maximum yield of high quality onions. High soil moisture tension, especially during periods of rapid growth, resulted in small onions with poor keeping quality. Low soil moisture tension, especially late in the season, increased the number of defective onions and delayed maturity. Lettuces had a low moisture requirement, 3 to 7 inches of water, either from rainfall or irrigation, being sufficient to mature a crop in Connecticut. The greatest benefits from irrigation were obtained at the time of planting the autumn crop. [From author's summary.]

605. Beeson, M. M.
Irrigation requirements.
N.Z. Comm. Gr, 1959, **14**(11): 10.

A general discussion in relation to vegetable crops.

606. Alghisi, P.
Principali malattie di alcune piante ortensi trasmissibili per seme e per organi vegetativi. II.—Malattie trasmissibili per seme. **(Principal diseases of vegetables transmissible by seeds and by vegetative organs. II. Seed-borne diseases.)**
Agric. Venezie, 1959, **13**: 345-53.

Symptoms and brief notes on control measures are given for the fungus, bacterial and virus diseases of tomato, red pepper, eggplant, runner bean and pea, for the fungus and virus diseases of lettuce, and for the fungus diseases of broad bean and cauliflower, that are known to be seed-transmitted.

607. Rogers, I. S., and Baskett, W. J.
Disinfection treatments for vegetable seeds.
J. Agric. S. Aust., 1959, **62**: 500-3, 510, illus.

A combination of hot-water treatment and chemical disinfection is recommended for the prevention of seed-borne diseases in tomatoes, brassicas, peas, onions and cucurbits. Mercuric chloride, TMTD and copper oxychloride are the recommended chemicals.

608. Ministry of Agriculture, London.
Red spider mite on glasshouse crops.
Adv. Leafl. Minist. Agric. Lond. **224**, 1959, pp. 8, illus.

Tetranychus telarius; the damage it causes and its control on vegetables and ornamentals.

609. Ministry of Agriculture, London.
Slugs and snails.
Adv. Leafl. Minist. Agric. Lond. **115**, 1959, pp. 8, illus.

And their control by poison baits, dusts and sprays, trapping and protective dressings.

610. Dormal, S., and others.
Étude de la persistance de résidus d'insecticides dans divers légumes frais, blanchis et stérilisés. **(A study on the persistence of insecticide residues in various fresh, blanched and sterilized vegetables.)** [English summary ⅓ p.]
Bull. Inst. agron. Gembloux, 1959, **27**: 137-47, bibl. 4.

Plots of spinach, beans and peas were treated with Phosdrin, Dipterex, parathion, Isochlorthion and DDT. Phosdrin and Dipterex were the only products to penetrate the pea pods, but their residues in the seeds were scarcely measurable, and in all 3 crops their persistence was brief (Phosdrin 4–6, Dipterex 6–12 days). Blanching virtually destroyed them in pea seeds and reduced them to 0·02% or less in spinach and beans harvested 4 days after treatment. Heat sterilization was even more effective in destroying them. Parathion and Isochlorthion residues were detected

12–20 days after application to spinach and beans. They were reduced by 30–85% by blanching and by 70–95% by sterilizing. DDT persisted for several weeks and its residues were more resistant than those of the other products to processing. In the fresh products, residues of all the insecticides were highest in spinach.

611. N.S.W. Department of Agriculture, Division of Horticulture.
Marketing perishable vegetables.
[*Publ.*] *N.S.W. Dep. Agric.*, 1957, pp. 32, illus., and *Agric. Gaz. N.S.W.*, 1959, **70**: 98-104, 136-45, illus.

The desiderata for ensuring that an acceptable product arrives at the market are given under the headings: handling, maturity, grading, containers and packing, ventilation, temperature, and transport. There follow short summaries of the points to be considered in connection with the packing and marketing of beans, beetroot, broccoli (sprouting), brussels sprouts, cabbages, carrots, cauliflowers, celery, cucumbers, lettuce, parsnips, peas, potatoes (new), rhubarb, rock melons, spinach-beet, and, in considerable detail, tomatoes.

Artichokes.

612. Attia, M. S., and El-Din, S. B.
On the propagation of the globe artichoke.
Agric. Res. Rev., Egypt, 1958, **36**: 502-5, bibl. 1.

Lateral basal shoots averaging 8 per plant were used in addition to the 4 cuttings obtained by splitting the stump and root system longitudinally. The average percentage establishment was almost identical for shoots (initially rootless) and stump sections; hence, the number of new plants was 3 times that obtained by the traditional method, even in the saline soil concerned. Stump sections showed better survival with than without a ball of soil remaining round the roots during transplanting.

613. Salunkhe, D. K.
Physiological and biochemical effects of gamma radiation on tubers of Jerusalem artichoke.
Bot. Gaz., 1959, **120**: 180-3, bibl. 5, illus.

High doses of gamma radiation (over 2 × 10^6 reps) caused softening and disintegration of tubers of Jerusalem artichoke. Darkening of the epidermis and enzymatic (oxidative) activity in the tubers were directly correlated with irradiation doses between 1 × 10^6 to 4 × 10^6 reps. With 8 × 10^6 and 10 × 10^6 reps these effects were diminished, and with doses above 20 × 10^6 reps colour was more like that in the controls. Chemical analysis of ethanol slurries of irradiated and non-irradiated tubers indicated that the amounts of reducing sugars, acidity, and permanganate values were positively, and the amounts of inulin, crude fibre, and pectic substances inversely, correlated with radiation dose; total solids and total sugars remained fairly constant. Viscosity of the slurries was approximately constant up to the dose of 4 × 10^6 reps. On the other hand, the viscosity was reduced with doses from 8 × 10^6 to 20 × 10^6 reps but increased with doses of 40 × 10^6 and 60 × 10^6 reps. A complete hydrolysis of inulin to fructose in the irradiated (60 × 10^6 reps) tubers was accomplished by a 1 *M* HCl treatment at 176° F. for 10 minutes. This was confirmed by paper chromatography. [From author's summary.]—Utah St. Univ., Logan.

Asparagus.

(*See also* 573, 576.)

614. Wiebe, J.
Asparagus.
Circ. Ont. Dep. Agric. **118**, 1959, pp. 5.

Culture and varieties in Ontario.

615. Fletcher, R. F.
Asparagus tips.
Leafl. Pa St. Univ. Ext. Serv. **207**, 1959, pp. 6, illus.

Advice on planting, cultivation and harvesting.

616. Huyskes, J. A.
The value of comparative tests of progenies from open-pollinated female asparagus plants.
Euphytica, 1959, **8**: 141-4, bibl. 5.

Seed yield determinations in an isolated seed garden show that a male asparagus plant only pollinates female plants within about 1·5 m. of it. The range of variation in spear yield was virtually the same in selected female plants as in their associated pollinators. It was concluded that the pollinators have as great an effect as the mother plants on the characters of progenies of open-pollinated plants. It is considered that assessment of the genetical value of open-pollinated mother plants on the basis of a progeny test is unreliable.—I.V.T., Wageningen.

617. Brennan, J. B.
Anatomical and respiration studies of the asparagus stem and the development of fibrousness during storage.
Diss. Abstr., 1959, **20**: 40, being *L.C. Card No. Mic.* 59-1890 of 82 pp.

In spears of Mary Washington most of the material classified as "fibre" consisted primarily of cellular fragments of pericyclic fibres and of tracheary elements. Older spears had a higher "fibre" percentage owing to the greater number of resistant cells with thicker walls. Spears stored with their cut ends immersed in water showed more elongation than those stored dry; in other experiments the former also showed a more mature degree of development in the pericyclic fibre ring (at 5 in.

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(from the tip of the spear), but a lower percentage of thick-walled tracheary elements per bundle (examinations made ½ in. above the ground line). These data indicate that there may be a slightly larger number of thick-walled cells in spears stored dry as compared with those stored wet. It was found that more CO_2 was evolved, and more O_2 taken up, by spears stored with their cut ends dry than those stored in water. However, in most cases the retardation of respiration caused by immersion of part of the spears in water would be sufficient to account for the observed differences, and thus spear respiration in both types of storage was not markedly different.—Univ. Md.

618. Schultz, H. B., and Carlton, A. B.
Field windbreaks for row crops.
Calif. Agric., 1959, **13**(11): 5-6.

Wind measurements in asparagus fields show that even in unprotected fields the velocity of cross winds was reduced to some extent by cross-orientation of the ridges; interplanting with barley only resulted in a slight additional reduction in wind velocity except at 2 ft. above the ground. The windbreak effect of interplanted barley was, however, very good when winds blew mainly parallel to the rows, but varying in direction from 0° to 45°. Inter-plantings under wind directions other than 0° or 90° gave the greatest amount of wind reduction at the lowest recording height (2 feet), wind velocities being reduced to 60–65% of those over bare ridges. Tree windbreaks reduced the velocity of winds blowing at right angles by 20–40% at a downwind distance of 10 times the tree height. At wind angles other than right angles protection by tree windbreaks was poorer, and they were useless for protection against parallel winds. [See also *H.A.*, 29: 406.]—Univ. Calif., Davis and Stockton.

619. Rohde, R. A.
Basis for resistance of *Asparagus officinalis* var. *altilis* L. to the stubby root nematode *Trichodorus christiei* Allen 1957.
Diss. Abstr., 1959, **20**: 21-2, being *L.C. Card No. Mic.* 59-1923 of 47 pp.

See *H.A.*, 29: 407.

Brassicas.

(*See also* 65, 573, 577, 746.)

620. Williams, A. M.
Brassicas.
A.R. Rosewarne exp. Hort. Stat., 1958, 1959, pp. 17-27.

In manurial trials with winter cauliflowers the highest overall yields and the highest percentage of heads in the top size grades were obtained by applications of dung plus NPK. Plots receiving N yielded better than those not receiving N, but there was less response to P and K. Dung increased the overall yield and the proportion of large heads. Further results of N.I.A.B. variety trials of winter cauliflowers are also reported. The results of time of planting and spacing trials with early and late winter cauliflowers clearly substantiated earlier findings, in that total yields from plots planted after mid-July were considerably lower than from earlier plantings, irrespective of the planting distances. In trace element studies broccoli plots treated with B showed a reduced incidence of stem rot, though the percentage of affected plants was still approximately 30. N.I.A.B. variety trials of summer cauliflowers, spring cabbages and hearted cabbages have been carried out. With cabbages dung plus NPK has consistently produced the highest yields. Of 4 fertilizers used for top dressing spring cabbages, nitrate of soda and sulphate of ammonia gave a heavier total yield than urea or nitrate of potash, when applied at 1·5 cwt. of N per acre in January and repeated in February.

621. Conev, T.
Nitrogenous compounds in different brassicas.
[Bulgarian, with Russian and German summaries.]
Nauč. Trud., Visš selskostop. Inst. "Georgi Dimitrov", Agron. Fak., 1958, **5**: 163-75, bibl., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 89.

Analyses were made on white and red cabbages, savoys, brussels sprouts and cauliflowers. The total N content based on fresh weight was 0·194–0·218% in white cabbage, 0·360% in red cabbage, 0·346–0·407% in cauliflower, 0·432–0·442% in savoy and 0·764% in brussels sprouts. The protein N ranged from 0·102 to 0·478%, while the α-amino N of the free amino acids varied between 0·035 and 0·112%. The variation in the amide N was particularly large, from 0·0063 to 0·41%, and that of ammonium N only slightly less, 0·0148–0·41%. [See also *H.A.*, 28: 2549.]

622. Agricultural Research Council Radiological Laboratory.
Strontium 90 in human diet in the United Kingdom 1958.
Rep. agric. Res. Coun. radiobiol. Lab. **1**, 1959, pp. 75, 4s.

Including data on leafy brassicas and brief mention of root vegetables.

623. Walker, J. C., Larson, R. H., and Taylor, A. L.
Diseases of cabbage and related plants.
Agric. Handbk. U.S. Dep. Agric. **144**, 1958, pp. 41, illus.

The related plants mentioned in the title are turnip, radish, rape, rutabaga [swede] and horse radish, the word cabbage covering the rest of the brassicas. The diseases are grouped under parasitic, non-parasitic, transit and storage diseases. All the main bacterial, fungal and viral infections are dealt with, a description of the symptoms being given and the recommended control methods outlined. Emphasis is laid on the value of new resistant varieties in the control of yellows, caused by *Fusarium oxysporum* f. *conglutinans*. The lesions caused by nematodes are described, and the use of soil fumigants and nematicides is explained. Of the non-parasitic maladies the effects of K, Mg, B and Mo deficiencies are outlined, as also injury due to cold, flooding, lightning and wind. Some of the commoner bacterial and fungal diseases of stored brassicas are mentioned, as well as damage caused by freezing, both in the field and under cover.

624. Taylor, C. E.
Pests of cabbages and related crops.
Rhod. agric. J., 1959, **56**: 159-61, illus.

Descriptions, injury and control of diamond-back moth (*Plutella maculipennis*), cabbage aphid (*Brevicoryne brassicae*), cutworms (*Agrostis* spp.) and 3 lesser pests.

625. North, C., and Frith, L. H.
An instrument for measuring the firmness of brussels sprouts.
J. hort. Sci., 1959, **34**: 183-8, bibl. 7, illus.

A pressure tester for assessing the firmness of brussels sprouts is described. It measures the diameter of a sprout before and after compression by a plunger 1 cm. in diameter to which a 2 kg. weight is applied. The diameter of the sprout after compression, expressed as a percentage of that before compression, is a measurement of sprout firmness. The instrument shows significant differences in firmness between varieties, and it is suggested that it is sufficiently accurate for use in studies of inheritance and the effects of climate and cultural treatment on sprout firmness. [Authors' summary.]—Scot. hort. Res. Inst., Invergowrie, Dundee.

626. Leuchs, F.
Über Beziehungen zwischen Fäulniserscheinungen, Wundheilung und Kaliversorgung an Rosenkohl. **(On the relationship between rotting, wound healing and potassium supply in brussels sprouts.)**
Z. PflKrankh., 1959, **66**: 499-508, bibl. 18.

It was found that putrefying bacteria could enter the sprouts only through open wounds. The origin of the wound had no influence on the occurrence of putrefaction. There were equal numbers of wounds in the sprouts from healthy and from diseased plots. Healing of the wounds was accelerated by maintaining a ratio of 1 : 2 in the supply of N and K_2O. When N and K_2O were supplied at this ratio less rotting occurred than when less potassium was supplied. [From authors' summary.]

627. Nieuwhof, M.
Problems in the design of variety trials with spring cabbage. [Dutch summary 7 lines.]
Euphytica, 1959, **8**: 151-6, illus.

Differences in productivity between 3 strains of the spring cabbage Eersteling could be explained partly in terms of length of growing period and partly in terms of rate of growth. In commercial trials with spring cabbage only one spacing proved necessary to obtain a sufficiently reliable comparison of the various characters. Commercial trials with spring cabbage arranged in a Latin square with one plant per plot will usually give sufficient practical information on the measurable characters. [From author's abstract.]—I.V.T., Wageningen.

628. Nieuwhof, M.
Some experiences with the breeding of pointed-headed cabbage. [Dutch summary $\frac{1}{4}$ p.]
Euphytica, 1959, **8**: 163-8, bibl. 1, illus.

An account of 10 years' work at the Institute of Horticultural Plant Breeding, Wageningen [see also *H.A.*, 29: 3723f].

629. Pestova, M. N., and Vlasova, L. N.
Means of increasing the early yields of the cabbage variety Nomer Pervyj [No. 1]. [Russian.]
Bjull. naučno.-tehn. Inf. n.-i. In-ta ovočsn. H-va, 1957, **2**: 20-2, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 48,945.

A 5- or 6-day delay in planting out cabbage seedlings raised in nutrient blocks reduced the amount of crop harvested before July 10 by 26%. For early cropping in the Moscow region the variety Nomer Pervyi should be sown at the end of February and planted out on light soils at the end of April, and on heavier soils up to May 5. Transplants 57 to 60 days old raised in 8 × 8 cm. blocks gave twice as much early produce as those raised in the usual 5·5 × 5·5 cm. blocks. Replacing peat-compost blocks by manure-sod blocks for raising the transplants increased early yields by 50%.

630. Gusev, P. P.
Causes of blindness in cabbage. [Russian.]
Sad i Ogorod, 1959, No. 5, pp. 22-4, illus.

Non-heading or the development of several small, loose heads in cabbages grown in the north of Russia was shown to be due to planting out immature seedlings, and not to late frost damage. It is suggested that blindness in cauliflower might be of like origin.

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631. KUPRIJANOVA, V. K.
The effect of coarse organo-mineral granules on the disease resistance and yield of cabbage seed plants. [Russian.]
Udobrenie i Urožaj, 1957, No. 8, pp. 48-50, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 48,944.

Placement of organo-mineral granules reduced disease incidence and increased seed yields compared with broadcast applications of similar amounts of FYM + NPK.

632. NAKAGAWA, H., AND HENMI, S.
Effect of low temperature treatment on autumn seed production of chinese cabbage. II. Relationship between the treatment period and seed production in typical chinese varieties. [Japanese, with English summary ¾ p.]
Reprinted from *Jap. J. Breed.*, 1958, **8**: 6-12, bibl. 19, illus., as *Misc. Publ. nat. Tohoku agric. Exp. Stat., hort. Div.*, **18**.

Five chinese cabbage varieties were subjected to low-temperature treatment for 15 or 30 days starting either 10, 30 or 70 days after sowing. The two later times at which low-temperature treatment was applied, but not the earliest time, affected the time at which flower bud differentiation occurred. The duration of the cold treatment also affected the time of differentiation. Plants which flowered in the warm season, or before September 20, set many good pods with many high-quality seeds per pod. Plants flowering after October 1 had many immature seeds. The variety Aichi was only slightly responsive to low temperature treatment.

633. LEVITT, J.
Effects of artificial increases in sugar content on frost hardiness.
Plant. Physiol., 1959, **34**: 401-2, bibl. 4.

Infiltration of frost-hardened cabbage leaves with dextrose or fructose resulted in an increased frost hardiness equal to the calculated increase on the basis of a purely osmotic effect. Infiltration with D-ribose failed to produce any greater increase than infiltration with either of the hexoses. [Author's summary. For earlier work see *H.A.*, 28: 1030.]—Univ. Missouri, Columbia.

634. CHALFANT, R. B.
Transmission of cabbage viruses A and B by the cabbage and green peach aphids.
Diss. Abstr., 1959, **20**: 432-3, being *L.C. Card No. Mic.* 59-2764 of 195 pp.

Tests on the transmission of cabbage viruses A and B by *Myzus persicae* and *Brevicoryne brassicae* showed that sticky barriers did not protect plants from outside infection; thus the wingless forms are probably not important in virus spread. In control experiments in one year the incidence of cabbage mosaic (a complex of A and B) was reduced by Thimet, Am. Cyanamid 12008 and parathion sprays, but no positive results were obtained in further trials owing to numerous outside sources of infection.—Univ. Wis., Madison.

635. DAVID, W. A. L., AND GARDINER, B. O. C.
The action of the systemic insecticide fluoroacetamide on certain aphids and on *Pieris brassicae* (L.).
Bull. ent. Res., 1959, **50**: 25-38, bibl. 20.

Details of numerous comparisons between sodium fluoroacetate and schradan for control of *Aphis fabae* on broad beans and *Brevicoryne brassicae*, *Myzus persicae* and *Pieris brassicae* on cabbages [see also *H.A.*, 28: 3642].

636. OČERETENKO, E.
The use of *Halocnemum strobilaceum* against cabbage pests. [Russian.]
Sad i Ogorod, 1959, No. 7, pp. 19-20.

A 1 : 10 decoction or infusion of *H. strobilaceum* + 0·4% soap gave very good control of cabbage pests including aphids and butterflies.

637. BJURMAN, B.
Lokala försök med blomkål och bönor 1952–1954. **(Local trials with cauliflowers and beans 1952-1954.)** [English and Esperanto summaries ¾ p. each.]
Medd. Trädgårdsförs. Alnarp **124**, 1959, pp. 18, bibl. 10.

Variety trials, chiefly in Northern Sweden.

638. KHAN, A. R., AND WAHEED, C. A.
Effect of different pollination treatments on seed formation and size of head in the next generation of cauliflower *(Brassica oleracea* var. *botrytis* L.).
Pakist. J. sci. Res., 1959, **11**: 12-19, from *Trop. Abstr.*, 1959, **14**, Abstr. g2803.

Although artificially and naturally crossed flowers gave a greater seeding percentage, greater length of pods and higher number of seeds per pod than artificially selfed flowers, there was no difference in weight or germination of the seeds. The progeny raised from seeds formed by naturally or artificially crossed flowers significantly outyielded those developed from artificially selfed flowers.

639. SAMPSON, D. R., AND MACARTHUR, M.
Floral abnormalities in broccoli.
Ann. Bot. Lond., 1959, **23**: 211-16, bibl. 4, illus.

Floral abnormalities, which apparently arise spontaneously in green sprouting broccoli, are described. Several types of abnormality may develop on a raceme. Conspicuous among these are flowers with united sepals which bear ovules ventrally on placentae along the lines of sepal union, and pads of stigmatic tissue at the apices of the sepals. Other abnormalities include open, boat-shaped gynoecia, and irregular terminal structures suggestive of laterally united gynoecia. Developmental aspects of the abnormalities are discussed, and their morphogenetic implications are noted. [Authors' summary.]—Central exp. Fm, Canada Dep. Agric., Ottawa.

640. Croxall, H. E., Norman, T. M., and Gwynne, D. C.
Yellow mosaic of broccoli in north-east England, 1953-57.
Plant Path., 1959, **8**: 99-107, bibl. 4.

A survey of the incidence and spread of yellow mosaic in broccoli was made on numerous crops at five centres in Northumberland and Durham over the years 1953–57. Beneficial effects on the progressive adoption of control measures were revealed by the survey. These methods included the isolation of seedbeds, treatment of seed with gamma-BHC dust, and spraying the seedbeds with DDT for the suppression of the flea beetle vectors. The amount of infection occurring after planting out was found to depend on the occurrence of sunny weather favouring flea beetle activity; on the proximity of infected brassica crops; and on the degree of shelter of the site. In exposed situations isolation of 20 yards effectively reduced spread, but in sheltered places isolation of at least 100 yards from heavily infected crops appeared to be needed. Spread of the disease was much faster within crops in gardens than within those in more exposed situations. There was an indication that spraying with DDT during periods of sunny weather in late summer may be useful on crops that are infected, or near to sources of infection, at that time. Plants only slightly infected before winter suffered severely from subsequent frost injury. Roguing-out of infected plants was found to be advantageous, and, as little spread occurs during the winter, the best time for such roguing appeared to be in the spring, before the emergence of the flea beetles from their hibernation. In a randomized block trial carried out in 1954–55 three row barriers of kale, barley or broad beans significantly reduced spread of the disease from infected to healthy plants. [Authors' summary.]—N.A.A.S., Newcastle upon Tyne.

641. Willis, R. J.
Chemical control of cabbage root fly attacks on cauliflower crops.
Res. exp. Rec. Minist. Agric. Belfast, 1959, **8**: 53-72, bibl. 10.

The results of 6 years' insecticide trials against *Erioischia brassicae* are summarized. A collar of γ-BHC or aldrin dust round each plant was as effective as a liquid drench of these compounds, and the liquid formulations were unsuitable for ridge grown plants. Root dip treatment with γ-BHC before transplanting was highly injurious, and other dip treatments retarded curd formation. Transplants raised in soil treated with γ-BHC dust at 50 lb. per acre were not retarded in growth and gave yields comparable to those of plants treated conventionally with calomel dust at transplanting, but an equivalent application of the liquid formulation of γ-BHC to the soil produced noticeable plant injury.

Celery.

(*See also* 534.)

642. Wilson, J. D.
New fungicides and the control of celery blights.
Res. Circ. Ohio agric. Exp. Stat. **66**, 1959, pp. 7, bibl. 4, illus.
Celery blight.
Ohio Fm Home Res., 1959, **44**: 9-10, illus.

Five fungicides, with and without the hydrocarbon oil mixture ML-100A, were tried out in 1957 and 1958 against both early (*Cercospora*) and late (*Septoria*) celery blights. Dyrene proved the most effective in both cases. Phaltan gave excellent control of early blight, but was less successful than either Dyrene or Manzate against *Septoria*. The addition of the oil improved the fungicidal action of 3 out of the 5 fungicides, namely Zerlate, Tribasic copper and Phaltan, and increased the yield in every case, the average increases being 38·3% without, and 48·7% with, the oil.

The second paper outlines the same work and suggests that where Dyrene is used it should be applied at 6-day intervals from 2 weeks after transplanting to 2 weeks before harvest at a rate of 3 lb. in 150 gal. water per acre.

Cucurbits.

(*See also* 60, 269, 520, 531, 573, 774, 972.)

643. Ivanov, A. E.
Cultivation of cucurbits on sandy soils. [Russian.]
Zemledelie, 1959, 7(5): 69-73, illus.

Crop rotation, soil management, fertilization, spacing and windbreaks are discussed for cucurbits grown in the south-eastern part of European Russia on a sandy soil not suitable for other crops. The cucurbits mainly concerned are water melons, melons, marrows and fodder water melons. Varieties are suggested for 3 separate regions.

644. Wiebe, J.
Cucumbers.
Circ. Ont. Dep. Agric. **347**, 1959, pp. 5.

Growing cucumbers in Ontario for slicing and pickling.

645. Ries, S. K.
Growing pickling cucumbers in Michigan.
Ext. Folder Mich. St. Univ. **F-191**, 1959, 1 folded sheet.

Varieties and cultural practices.

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646. Gilbert, J. C.
Disease resistant cucumbers for Hawaii.
Hawaii Fm Sci., 1959, 7(4): 1-2, illus.

The important cucumber diseases in Hawaii are powdery mildew (*Erysiphe cichoracearum*) and mosaic virus. No varieties have been found immune to either of these pathogens, but varying degrees of resistance occur. A new hybrid has been produced that is fairly resistant to the mildew and is tolerant to mosaic. However, a more malignant form of mosaic virus developed in the testing grounds in 1958, but this has not yet been permitted to spread to the commercial crop.

647. Czao, C.-S.
The effect of external factors on the sex ratio of cucumber flowers. [Chinese, with English summary.]
Acta scient. natur. Univ. pekinensis, 1957, **3**(2): 233-45, bibl. 13, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 48,566.

Treatment of 25-day-old cucumber seedlings with 1, 0·5 and 0·3% CO for 161 hours increased the number of female flowers and depressed male flower formation. Respiration intensity and catalase activity were reduced. Ample P fertilization and a high soil moisture content also increased female flower development; in the latter case the plants absorbed more N.

648. v. Hösslin, R., and Sieber, J.
Der Einfluss der Fruchtgrösse bei der Ernte auf die Remontierfähigkeit von Gewächshausgurken. **(The effect of fruit size at harvest on the regenerative capacity of glasshouse cucumbers.)**
Gartenbauwiss., 1958, **23**: 532-77, bibl. 12.

Early harvesting increased both the vegetative growth and the longevity of glasshouse cucumber plants, the number of lateral shoots in particular being increased markedly. The earlier the stage at which the fruits were cut, the stronger was the secondary growth and the greater the total number of fruits set. In addition, the fruits developed sooner, and the number of ripe cucumbers increased with early cutting. The formation of new fruits was not continuous but intermittent. During the first half of the growing period the intervals were relatively long, but they became shorter in the second half. There was less variation in total weight than in the number of fruits produced. The total weight of fruit harvested at first increased with increasing weight per fruit, but later decreased while the weight per fruit continued to rise.—Inst. Gemüseb. Staatl. Lehr-u. Forsch. Anst. Gartenb., Weihenstephan.

649. Belov, E. A.
The effect of organo-mineral mixtures on the microbiological processes in the soil and below plants. [Russian.]
Agrobiologija, 1959, No. 2, pp. 236-41.

Placement of 4 tons of compost + 2 centners of a phosphate fertilizer per ha. beneath group-planted cucumbers increased the microflora in the rhizosphere, not only in the planting holes but also in the inter-rows.

650. Norman, A. G.
Inhibition of root growth and cation uptake by antibiotics.
Proc. Soil Sci. Soc. Amer., 1959, **23**: 368-70, bibl. 12.

Microbial products of an antibiotic nature produced in the rhizosphere may affect root growth and development. Twenty newer antibiotics have been tested to determine their activity in repressing elongation of roots of cucumber and growth of barley roots as measured by weight changes. Potency in repressing root elongation was found in most; 7 caused 50% repression at concentrations <10 μg. per ml. In no case was uptake found to be more sensitive than growth, and, with 4 of the 5 antibiotics studied, significant repression of uptake was observed only at concentrations many fold greater than those repressing growth. [From author's abstract.]

651. Nezgovorov, L. A.
The effect of the pathogen content of the soil on photosynthesis and the chlorophyll content during the chilling of cucumber plants. [Russian, with English summary ⅓ p.]
Fiziol. Rast., 1959, **6**: 585-91, bibl. 15.

Prolonged chilling (10–12° C.) and subsequent growth under warmer conditions caused a smaller reduction in the rate of photosynthesis when the soil in which cucumbers were reared was treated with thiuram. Reduced photosynthesis following chilling was due mainly to the destruction of chlorophyll, and this was accentuated by the presence of *Pythium debaryanum* in the soil. [For earlier work see *H.A.*, 29: 2421.]

652. McKeen, C. D.
Cucumber necrosis virus.
Canad. J. Bot., 1959, **37**: 913-25, bibl. 23, illus.

Including symptoms and infection via the roots.

653. Plate, H.-P.
Zur Bekämpfung des Blattbrandes der Gurke. **(On the control of cucumber blotch.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 165-6, bibl. 2.

In two years' trials cucumber blotch (*Cercospora melonis*) was controlled by two mercury compounds and by maneb. Mercury compounds should not, however, be used on vegetables.—PflSchAmt, Berlin.

654. Smith, H. M., and Hunter, J. S.
A market test for a new variety of cantaloup.
Agric. Mktg, 1959, **4**(6): 4.

Favourable wholesaler, retailer, and consumer reactions to the new Texas variety Rio Gold.

655. Molnár, B.
A sárgadinnye kedvező vetési időpontjának megállapítása. **(Optimal sowing time for cantaloupe melons.)** [Russian and English summaries ½ p. each.]
Növénytermelés, 1959, **8**: 103-10, bibl. 5.

Laboratory experiments and field trials in 8 locations over 5 years have shown that the temperature sum required to obtain satisfactory emergence of cantaloupe seedlings is 200° C. in the first 12 days after sowing. This is equivalent to a daily air temperature of 18° C. and a soil temperature of 15–16° C. No varietal differences were apparent. The pre-emergence phase was more accurately defined by this temperature sum than by the days elapsed after sowing, the variation in the latter being 12 days and in the former 100° C., which was equivalent to 5–6 days at most.—Hort. Res. Inst. Budatétény.

656. Lall, B. S., and Sinha, S. N.
On the biology of the melon fly, *Dacus cucurbitae* (Coq.) Diptera: Trypetidae.
Sci. and Cult., 1959, **25**: 159-61, bibl. 5.

Fortnightly spraying with 11·35 g. of DDT 50% wettable powder plus 0·5 lb. of sugar in 1 gal. of water reduced infestation from 34·3 to 19·7%.—Bihar agric. Coll., Sabour (Bhagalpur).

657. Skripnikov, Ju. G.
A new form of pumpkin. [Russian.]
Agrobiologija, 1958, No. 6, pp. 137-8, illus.

Seedling progeny of a *C. maxima* plant which had been grafted with a *C. pepo* scion.

658. Abdel-Samie, A. S.
Yield and sex expression of squash as influenced by nutrition, date of planting and frequency of picking.
Agric. Res. Rev., Egypt, 1958, **36**: 480-501, bibl. 26, illus.

With the variety Iskandarani sowing on March 16 resulted in more male and female flowers and higher yields than sowing on August 16. When farmyard manure and superphosphate were applied before sowing, and sodium nitrate 3 weeks after sowing and 1 week after flowering, the total weight of fruit produced was nearly 50% greater than that of the controls at the early planting date, and more than double at the later date. The ratio of male to female flowers, about 2, was not affected by the treatments. Fruit weights and total yields decreased as the picking interval was shortened from 3 to 2 days, and were lower still with daily picking. Fruit number was inversely related to fruit weight.

659. Ivanovskaja, T. L., and Gavrilova, N. S.
The effectiveness of local surface applications of organo-mineral mixtures under sugar beet and squash. [Russian.]
Agrobiologija, 1958, No. 6, pp. 93-7, bibl. 3.

Surface placement of compost + superphosphate + lime, with or without NK, for squash grown in groups enhanced earliness and more than doubled yields.

660. Semerinova, A. G.
The effect of phosphorobacterin on watermelon yields. [Russian.]
Nauč. Tr. Bykovsk. bahčevoj opit. Stan., 1957, No. 4, pp. 36-41, from *Ref. Ž.* (*Biol.*), 1958, No. 12, Abstr. 53,645.

Seed treatment with phosphorobacterin on the day of sowing advanced plant development by 3–5 days and increased yields.

661. Attia, M. S., and Nassar, S. H.
Effect of local propagation of the Chilean black variety of watermelon and some fertilizer treatments on the quality of fruits.
Agric. Res. Rev., Egypt, 1958, **36**: 367-96, bibl. 4.

Crops raised in Egypt from imported seed and from locally produced 1st and 2nd generation seed were compared, and the effects of pigeon manure and chemical fertilizers contrasted in 3 years. No significant differences in yield or thickness of rind were obtained from either seed source or fertilizer. Average fruit size was diminished by using locally-grown seed and increased by using pigeon manure, and the manure also increased the sugar content.

662. Abdel-Samie, A. S.
Effect of organic and inorganic fertilizers on the growth and yield of water-melons.
Agric. Res. Rev., Egypt, 1958, **36**: 463-79, bibl. 16, illus.

No significant effects on the height of plants and numbers of male and female flowers were obtained by varying the fertilizers, although the ratio of male to female flowers was greatest with cotton-seed meal applied before planting plus pigeon manure applied after anthesis, and lowest with cotton-seed meal applied alone on both occasions. The highest yields were obtained with a pre-planting dressing of cotton-seed meal followed by pigeon manure during fruiting. A pre-planting cotton-seed meal application followed by nitrate of soda during fruiting ranked next in yield order. Both these yields were more than double that of the controls.

663. Bradley, G. A., and Fleming, J. W.
Fertilization and foliar analysis studies on watermelons.
Bull. Ark. agric. Exp. Stat. **610,** 1959, pp. 32, bibl. 23, illus.

The bulletin gives the results of experiments carried

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out in the years 1956–58 on a fine sandy soil, the effects of the various combinations of N, K and P being evaluated in terms of number, size, sugar content and total yields of marketable produce, and related to determinations of the foliar contents of K, P, Ca and Mg. Good yields were assured by 60 lb. per acre of N (30 lb. under the row and 30 lb. as a side dressing), 60 lb. of P and 30–60 lb. of K. The main effect of adequate fertilizer was on the number, and not on the size, of the fruits. The sugar content was slightly reduced by deficiency of any of the main nutrients. A method of finding the critical percentage of K and P from foliar analysis is outlined. It has given a high rate of accuracy in predicting yields. [See also *H.A.*, 29: 3603.]

Legumes—beans

(*See also* 32, 50, 61, 72, 533, 573, 578, 635, 637, 686, 693, 702, 769.)

664. WIEBE, J.
Snap beans.
Circ. Ont. Dep. Agric. **349**, 1959, pp. 4.

Culture and varieties in Ontario.

665. RIES, S. K.
Snap bean production in Michigan.
Ext. Folder Mich. St. Univ. **F-218**, revised 1959, 1 folded sheet.

Including recommended varieties for marketing and processing.

666. HAMMETT, H. L.
Tests show better snap bean varieties.
Miss. Fm Res., 1959, **22**(3): 5.

Of the 7 varieties tested through 2 autumn and 1 spring crops, Wade, Topcrop and Contender gave the highest yields. The quality of these three varieties was satisfactory.

667. CELESTINO, A. F.
Dry bean production of promising bush lima beans.
Philipp. Agric., 1959, **43**: 240-1.

Habas lima significantly the best of the 6 varieties tested.

668. KYLE, J. H.
Factors influencing water entry through the micropyle in *Phaseolus vulgaris* L. and their significance in inheritance studies of hard seeds.
Diss. Abstr., 1959, **20**: 840, being *L.C. Card No. Mic.* 59-3155 of 66 pp.

Water absorption by Great Northern bean seeds was directly proportional to the size of the micropylar opening, but with Red Mexican beans, which were more permeable in the hilum-raphe area, water absorption was independent of the size of the micropyle. Population studies indicated that the inheritance of permeability in the hilum-raphe area and also the frequency of beans of a certain micropyle size were associated with seed coat colour.—St. Coll. Wash.

669. ATTIA, M. S., AND NASSAR, S. H.
Study on the performance of some snapbean varieties [in relation] to different methods of planting.
Agric. Res. Rev., Egypt, 1958, **36**: 397-9, bibl. 3.

In 2 successive seasons 4 varieties were sown in two ways on ridges spaced 60 cm. apart. In one method groups of seeds were sown 20 cm. apart along the ridges, and in the other single seeds were spaced 7 cm. apart along the ridges. Row planting at 7 cm. gave a 40% greater return than grouping. Contender and Wade easily outstripped the other varieties in total crop, the former also giving an outstandingly heavy early yield, more than 50% greater than Wade.

670. SISTRUNK, W. A.
Effect of certain field and processing factors on the texture of Blue Lake green beans.
Diss. Abstr., 1959, **20**: 983-4, being *L.C. Card No. Mic.* 59-3414 of 158 pp.

The percentage of sloughed skins and the firmness of canned beans was found to be affected by irrigation and mulch treatments, date of harvest, variety, and size of beans.—Ore. St. Coll.

671. CERVATO, A.
Esperienze di concimazioni fogliari azoto-potassiche su fagiolo, pisello e lattuga. **(Experiments in foliar nitrogen-potassium nutrition of beans, peas and lettuces.)** [French and English summaries ½ p. each.]
Ann. Fac. Agrar. Univ. catt. S. Cuore, Milano, 1958, **66**: 53-71, bibl. 38, illus.

Proprietary foliar fertilizers supplying N and K_2O in different ratios were applied to bean, pea and lettuce plants growing in frames, and to beans in pots, in different types of soil. There was little or no response on a fertile soil with good structure, but all 3 crops responded on a terra rossa deficient in Ca and N. On this soil K-deficiency symptoms developed by young bean plants were eliminated, and pod yields slightly increased, by foliar sprays with N : K_2O ratios of 1 : 2 or 1 : 4, but a 2 : 1 ratio more than doubled the yield and increased the dry weight and mineral content of pods, as well as curing the K-deficiency symptoms. The only significant response of peas was a pod-yield increase of 18% with an 8 : 1 spray applied to plants growing in terra rossa, while lettuce yields were increased by 19·3% under the same conditions and by 61% with the 2 : 1 spray.

672. HATCHER, J. T., BLAIR, G. Y., AND BOWER, C. A.
Response of beans to dissolved and adsorbed boron.
Soil Sci., 1959, **88**: 98-100, bibl. 4.

To determine whether plants respond to adsorbed B *per se*, beans were grown at approximately equivalent solution concentrations in three soils having a wide range of B adsorptive capacities. Three solution concentrations of B (0·1, 5, and 10 mg./l.) were employed. It was found that plants respond only to B in solution and are not directly influenced by adsorbed B. [Authors' summary.]—U.S. Salinity Lab., Riverside, Calif.

673. Pleškov, B. P., and Ivanko, Š.
Předběžná zpráva o zkoumání obsahu volných aminokyselin v rostlinách. **(A preliminary report on a study of the free amino acid content of plants.)** [Russian and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 705-14, bibl. 26, illus.

The effect of varying the NPK nutrition on the free amino acid content of bean leaves was most marked in the cases of arginine, aspartic acid, serine and glycine. K deficiency increased the free amino acid content 1½-fold, but it was unaffected by P deficiency, and was reduced to 40% by a deficiency of N. These figures are compared with similar determinations made on maize leaves and roots. Vacuum infiltration of mineral N compounds into the leaves was followed after 2 hrs by a noticeable increase in the free amino acid content, which after 7 hrs had practically doubled. [For an earlier communication see *H.A.*, 28: 2589.]

674. Young, R. H., and Shannon, L. M.
Malonate as a participant in organic acid metabolism in bush bean leaves.
Plant Physiol., 1959, **34**: 149-52, bibl. 21.

See also *H.A.*, 29: 2053.

675. Dedolph, R. R.
Response of lima beans to growth regulators.
Diss. Abstr., 1959, **20**: 837, being *L.C. Card No. Mic.* 59-3012 of 184 pp.

Glucose, boric acid or borated glucose improved bean yields when applied with Duraset (N-metatolyl phthalamic acid) in combination with various levels of IAA. At median concentrations IAA increased initial set, but set was equal to the control at high levels of IAA. Set was decreased when IAA was applied to the flower pedicel as compared with application to the tip or base of the racemes. A variable dosage sprayer was constructed for use in studies of auxin levels; formulae, methods, principles of construction and statistical evaluation are discussed. A field study using this sprayer showed that yield was directly correlated with the concentration of IAA applied at the flower bud stage. Applications of TIBA (1-1,000 p.p.m.) reversed the IAA effect, and showed no synergistic action at any concentration used. Thus yield is dependent on the auxin level, which is critically low in lima beans before anthesis. Repeated applications of IAA or TIBA produced a cumulative effect, but the most pronounced effect was from the pre-anthesis treatment. The increase in bean number after IAA treatment was greater than the increase in pod number. Increases in dry weight of seeds following IAA treatment approached 300%. Benzathiozolyl-2-oxyacetic acid greatly increased pod number when applied at levels between 1 and 50 p.p.m. Concentration response curves are also presented for 2,4,5-T and Duraset. —Univ. Md.

676. Papavizas, G. C., and Davey, C. B.
Investigations on the control of the *Rhizoctonia* disease of snap beans by green organic soil amendments.
From abstr. in *Phytopathology*, 1959, **49**: 525.

In a greenhouse 5 green organic amendments were added singly at the rate of 1% to unsterilized sandy soil naturally infested with *Rhizoctonia solani.* Initial fallow periods of 0, 10, and 24 days were followed by 3 successive plantings of susceptible Topcrop snap beans. Green corn and oats stimulated the highest numbers of rhizosphere and soil streptomycetes antagonistic to *R. solani in vitro* and reduced the infection index. These amendments also decreased the prevalence of the pathogen in the planted and unplanted soil as determined by colonization studies. Sudan grass and no amendment resulted in few antagonistic streptomycetes and in the highest infection index, whereas bean and buckwheat amendments were intermediate in these respects. All amendments became less effective in controlling the disease with time after incorporation.

677. Thomas, W. O.
Soil fungicides fail to increase bush bean yields.
Miss. Fm Res., 1959, **22**(6): 6.

In one of 3 experimental years soil sterilization with Vapam or Bedrench at 30 gal./acre, or with Mylone W-50 at 175 lb./acre, significantly increased seedling stands, but not yields, and kept the plots free from grass for 3 weeks after sowing. Fourteen other soil fungicides tested were less satisfactory, and all the treatments were uneconomic.

678. Batth, S. S., and Davidson, R. H.
Tedion induced sterility of *Tetranychus telarius* (L.).
J. econ. Ent., 1959, **52**: 535-6, bibl. 2.

As dosage of Tedion was increased the percentage of mite eggs hatching on beans decreased.

679. Gyrisco, G. G., Muka, A. A., and Briant, A. M.
Studies of flavors and odors of potatoes and red kidney beans grown in rotation with lindane-treated red clover.
J. econ. Ent., 1959, **52**: 473-5, bibl. 7.

Lindane applied in 2 consecutive years at 1 lb./acre caused no off-flavour in the succeeding bean crops.

680. SALAS, L., AND RUPPEL, R. F.
Efectividad de insecticidas aplicados en polvo para controlar las principales plagas del fríjol y del maíz almacenados, en Colombia. **(Effectiveness of insecticidal dusts used in Colombia for controlling the chief pests of stored kidney beans and maize.)**
Agric. trop. Bogotá, 1959, **15**: 93-108, bibl. 18.

Rapid and effective curative action against the bean weevil (*Acanthoscelides obtectus*) was achieved by dusting the seeds with lindane, methoxychlor or malathion, each at 2·5–10 p.p.m., or with a proprietary mixture adjusted to supply 8·5–34 p.p.m. of piperonyl butoxide and 0·5–2 p.p.m. of pyrethrin. The protection failed to last for 3 months in the cases of methoxychlor and of the lowest concentration of malathion. [For earlier work see *H.A.*, 28: 2598.]

681. FLETCHER, R. F.
Machine successfully harvests snap beans.
Science for the Farmer, 1959, **6**(4): 7, illus.

In trials in Pennsylvania little difference was observed in the quality of beans harvested by hand and by machine. A slight reduction of yield occurred with machine picking, because the crop could be picked once only. Level fields free from stones and the absence of ridging helped to increase the efficiency of the harvester.

682. VIDAL, A. A.
Determinación de lecitina y cefalina en semillas de leguminosas. **(Determination of lecithin and cephalin in leguminous seeds.)** [English summary 7 lines.]
Rev. Fac. Agron. La Plata, 1958, **34**: 81-90, bibl. 14.

Methods and results for peas, broad beans, *Phaseolus angularis* and lima beans.

683. RECALDE, L., AND OTHERS.
Experiencias de abonado en la vega de Granada. 1. Efecto de la adición al suelo de paja y turba. **(Fertilizer experiments in the fertile plain of Granada. I. Effects of applying straw and peat to the soil.)** [English summary 3 lines.]
An. Edafol. Fisiol. veg., 1959, **18**: 33-48, bibl. 17.

Composition figures are given for both amendments. Broad beans were planted in November, in a silty clay soil, and at the same time 4,000 kg. of straw or 20,000 kg. of peat or half as much of each in combination were applied per ha. Seed yields in tons per ha. were 5·03 from peat, 4·83 from straw, 4·72 without amendment, and 4·36 from the mixture. The peat had the most favourable effects on the soil's N content, C/N ratio, available P and *Azotobacter* index.

684. MORRISON, R. I., AND DEKOCK, P. C.
Glyceric acid in broad bean (*Vicia faba* L.).
Nature, 1959, **184**: 819, bibl. 8.

Glyceric acid was shown to be one of the major acids accumulated, and the content of this substance, as well as of malic and citric acids, is given for various parts of the plant.—Macaulay Inst. Soil Res., Craigiebuckler.

685. CANOVA, A.
Avversità delle colture orticole. Fava. **(Diseases and pests of vegetables. Broad beans.)**
Progr. agric., 1959, **5**: 1180-1, illus.

The beetle *Sitona lineatus* is controlled by lead arsenate or by chlorinated hydrocarbons, and *Aphis fabae* by phosphoric esters. Copper fungicides are recommended against *Cercospora* leaf spot and sulphur against rust (*Uromyces fabae*). Broomrape (*Orobanche* sp.) can only be controlled by selecting resistant varieties of broad bean or by avoiding infested land.

Legumes—peas.

(*See also* 63, 78, 79, 81, 520, 573, 579-581, 671.)

686. BIRECKA, H., SZYMAŃSKA, W., AND SAWICKA, A.
Wpływ niskich dawek promieni Roentgena na niektóre gatunki roślin wyższych. **(The effect of low X-ray dosages on some species of plants.)** [English and Russian summaries $\frac{3}{4}$ p. each.]
Roczn. Nauk roln., Ser. A, 1959, **79**: 911-27, bibl. 19.

X-ray treatment was applied to seeds of 4 species, among which were peas receiving 350 and 500r and beans receiving 350, 500 and 750r. Beans showed no response, but in the early development of peas a small improvement was noted and this was maintained throughout the growing period. A similar effect was obtained by soaking untreated pea seeds in distilled water.

687. MARX, G. A.
Agronomic responses of canning peas to a new seeding implement.
Diss. Abstr., 1959, **20**: 449-50, being *L.C. Card No. Mic.* 59-2772 of 137 pp.

Pea seed distribution was more uniform in depth with an experimental drill than with the conventional drill, but it was not followed by more uniform seedling emergence. Plots sown by the experimental drill tended to give a higher percentage of plants per pound of seed sown, but there were no differences in uniformity of flowering, fruiting and maturity. At identical initial seed rates plots sown with the experimental drill consistently produced higher yields than those sown with the conventional drill. The highest yields were obtained when the theoretical distance between plants was $1\frac{7}{16}$ in. Wider spacing gave a corresponding increase in pod number per plant and pea number per pod. Plot yields were estimated with considerable accuracy from small sample data. The multiple regression technique was used to illustrate that only two components, plant population and weight of peas per plant, need be used to predict plot yield.—Univ. Wis.

688. Cline, R. A., and Erickson, A. E.
The effect of oxygen diffusion rate and applied fertilizer on the growth, yield, and chemical composition of peas.
Proc. Soil Sci. Soc. Amer., 1959, **23**: 333-5, bibl. 11.

Peas were grown in containers with the water table at 2–10 in. below the soil surface, thus giving a range of oxygen diffusion rates from very low to adequate. A fertilizer consisting of ammonium nitrate, potassium chloride and calcium phosphate, was applied at low, medium and high rates. The composition of roots and tops after 80 days, and the measurement of plant height after 30 and 80 days, showed that at low rates of soil aeration, fertilizer rates had little effect on growth, but that nutrient uptake and growth both increased as the oxygen diffusion rate rose from 15×10^{-8} to 72×10^{-8} g. per sq. cm. per min. High and medium fertilizer applications partially counteracted the effects of oxygen deficiency.

689. Bartz, J. F.
Yield and ovule development of Alaska peas as influenced by nutrition and soil moisture.
Diss. Abstr., 1959, **20**: 834-5, being *L.C. Card No. Mic.* 59-3167 of 124 pp.

Greenhouse experiments showed that, at canning maturity, approximately two-thirds of the P in pea seeds was derived from the substrate, and one-third by redistribution of P from other organs of the plant. When the P supply was low, foliar applications of P at flowering increased the P content of the peas. In general, foliar applications had a greater influence on pod number per plant than on pea number per pod. A factorial study on P availability showed that the effect of soil moisture on plant growth was much greater than that of soil type or of P source. In general, monopotassium phosphate resulted in more growth and a higher P content than did monocalcium phosphate for all soil and moisture level treatments. Yields of Alaska peas in the field were increased by 600 lb. per acre after the application of a P fertilizer; this increase was partly due to an increase in pod number per plant. Foliar P increased pea yields by 200 lb. per acre when no soil applications of P were given, but had no yield effect when soil P was applied. Field trials with several monobasic orthophosphate compounds showed that there was a large tissue-P response to all of them during early vegetative growth, and at this stage ammonium phosphate tended to be superior to calcium, sodium or potassium phosphates. Plant counts of peas and pods showed that practically all of the yield difference due to P fertilizers was localized in the third pod node. Pod fill was reduced more by low soil moisture levels between flowering and maturity than by low moisture throughout growth. Moisture levels above field capacity from blossom to maturity reduced pod fill more than any other treatment. The P content of the vines decreased, while that of the peas increased, with decreasing soil moisture. Vine contents of K increased with decreasing soil moisture levels. When Alaska plants were grown in nutrient cultures the ratio vine weight: pea weight varied from less than 1 for the lowest level of P to infinity for the lowest levels of Ca and B. At the highest pea and vine yields, the ratio varied from 2·2 to 3·6. The vine weight : pea weight ratio was not affected by S levels.—Univ. Wis., Madison.

690. Hollis, W. L.
The utilization of nitrogen by peas.
Diss. Abstr., 1959, **20**: 838-9, being *L.C. Card No. Mic.* 59-1920 of 74 pp.

Yields of peas decreased, although vegetative growth increased, as the N content of a mixed fertilizer was increased. After cyanamide applications, which supplied 300 and 360 lb. of N per acre, plants showed foliar burning due to root injury. Soil nitrate and ammonia levels were higher in plots receiving higher N levels. There was no plant response to cyanamide when it was ploughed in 4 days after application, but there was a yield effect after disking. The amount of N reclaimed from the crop after 3 different fertilizer treatments was as follows: 87% from cyanamide broadcast more than 4 weeks before ploughing; 53% from mixed fertilizer drilled in, and 47% from ammonium nitrate top-dressed before flowering. Growth and yield were directly related to the total amounts of N present throughout the season in the root zone. Yields were related in particular to the available N during flowering and at 3–5 days before harvest. If the available N was limited just before harvest, growth was maintained by an accelerated redistribution of N from other plant parts, and this resulted in faster maturation. At the stage of processing maturity the pods and peas accounted for 40–50% of the total dry weight and contained two-thirds of the total N taken up.—Univ. Md.

691. McCune, D. C., and Galston, A. W.
Inverse effects of gibberellin on peroxidase activity and growth in dwarf strains of peas and corn.
Plant. Physiol., 1959, **34**: 416-18, bibl. 8.

Using the 5th internode of the pea it was found that the dwarf variety Progress No. 9 has a greater level of peroxidase activity than the tall variety Alaska.

reatment with GA increases the growth rate and ecreases the peroxidase level of this dwarf. In laska peas GA affected neither the growth rate or the peroxidase level. [From authors' summary.] –Yale Univ., New Haven, Conn.

692. Lockwood, J. L., and Ballard, J. C.
Factors affecting a seedling test for evaluating resistance of pea to *Aphanomyces* root rot.
Phytopathology, 1959, **49**: 406-10, bibl. 3.

he technique of determining resistance to *Aphano-yces euteiches*.

693. Young, J. R., and Ditman, L. P.
Effectiveness of some newer insecticides for control of *Macrosiphum pisi* (Harris) and *Epilachna varivestis* Muls.
J. econ. Ent., 1959, **52**: 541-2, bibl. 2.

rithion, phosphamidon, malathion, dimethoate nd Am. cyanamid 18,706 gave a highly satis-ctory reduction of aphids (*M. pisi*) on peas. hosphamidon, dimethoate and Am. Cyanamid 7,708 compared favourably with malathion for ontrol of the Mexican bean beetle (*E. varivestis*). -Md agric. Exp. Stat., College Park.

694. Perutík, R.
Obaleč hrachový (*Laspeyresia nigricana* Steph.) I. O škodlivosti housenek a vztahu počátku plného květu porostu ke stupni napadení. **(The pea moth (*L. nigricana*). I. Damage caused by the larvae, and the relationship of the time of full flowering to the degree of infestation.)** [English, Russian and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 419-30, bibl. 26.

he average reduction of absolute weight [weight f 1,000 seeds] due to damage by the pea moth in varieties of pea was 29·33%, and germination of e damaged seeds averaged only 47·7% of that f undamaged seeds. The earlier the plants eached the full flowering stage, the less pronounced as the infestation, with consequent higher yields. ate sowing also reduced infestation, but resulted lower yields.

695. Danielson, C. E.
Sugar and starch in ripening peas.
Acta Agric. Scand., 1959, **9**: 181-8, bibl. 4.

n the variety Profusion the sugar content of the eed was constant during the greater part of the pening period, but fell rapidly at the end [see also .*A.*, 29: 3722i]. Starch was produced slowly at rst but rapidly later. The tenderometer value was ound to be an unreliable measure of the starch ontent in abnormal seasons. In 1956 peas sown rly ripened twice as rapidly as those sown 14 days ter, although the total growth period of the tter was 3 days less.—Findus Res. Lab., Bjuv.

696. Nonnecke, I. L., Strachan, G., and Anderson, D. T.
Note on a plot-size canning pea viner.
Canad. J. Plant Sci., 1959, **39**: 402-4, bibl. 2, illus.

Modifications of a machine [see *H.A.*, 22: 631k] are described, by means of which small experimental plots of peas can be vined more than 3 times as rapidly as by hand picking and hand shelling.—Canada Dep. Agric., Lethbridge, Al.

697. Lee, F. A.
A chemical effect of ethylene during the storage of peas.
Nature, 1959, **184**: 462, bibl. 3.

The peroxide values of crude lipids extracted from cold-stored peas kept in their pods were higher than those of similar peas which were shelled. Flavour deterioration was retarded in the unshelled peas. In this experiment the introduction of 0·02% of ethylene into the storage atmosphere of shelled peas resulted in similar peroxide values of extracted crude lipids to those of the unshelled peas after 7 months' storage at −17·8° C.—Cornell Univ., Geneva, N.Y.

Lettuce.

(*See also* 11, 20, 74, 107, 211, 269, 573, 597, 671.)

698. Ikuma, H., and Thimann, K. V.
Photosensitive site in lettuce seeds.
Science, 1959, **130**: 568-9, bibl. 11.

Red light is effective in promoting germination of Grand Rapids lettuce seeds, and far-red light is effective in inhibiting it, when only the hypocotyl half of the seed is exposed to the light. It is concluded that the photoreceptor is probably located in the tip of the hypocotyl. [From authors' abstract. See also *H.A.*, 29: 492.]—Harvard Univ., Cambridge, Mass.

699. Haber, A. H., and Tolbert, N. E.
Metabolism of C^{14}-bicarbonate, P^{32}-phosphate or S^{35}- sulfate by lettuce seed during germination.
Plant Physiol., 1959, **34**: 376-80, bibl. 41.

The full account of work abstracted in *H.A.*, 29: 493.

700. Poljakoff-Mayber, A., Mayer, A. M., and Zacks, S.
The effect of PCIB on the germination and growth of lettuce in the presence of thiourea.
Ann. Bot. Lond., 1959, **23**: 361-3, bibl. 11.

The joint action of the anti-auxin parachlorophenoxy isobutyric acid (PCIB) and thiourea on germination and growth of lettuce seed was investigated. PCIB alone did not affect germination or hypocotyl growth of lettuce. Root growth was stimulated by PCIB. In germination PCIB showed interaction at all the thiourea concentrations.

All thiourea concentrations reversed the stimulation of root growth caused by PCIB, except the lowest thiourea concentration with the highest PCIB one. In hypocotyl growth the two substances showed no interaction. These results are discussed in relation to the auxin and anti-auxin effects in germination and growth. [Author's abstract.]—Hebrew Univ., Jerusalem, and Israel Inst. Technol., Haifa.

701. Adams, F., and Sayegh, A.
Plant response to nitrogen, phosphorus, and potassium in soils of Lebanon as indicated by greenhouse pot experiments.
Publ. Amer. Univ. Beirut **1**, 1945, pp. 10, bibl. 3, [received 1959].

N and P gave increased growth of lettuces on practically all of 31 soils from different localities, but K gave a possible increase on only 1 soil.

702. Islam, M. A., and Rahman, A. F. M. H.
Degree of phosphate saturation of soils as a measure of phosphate availability for plants.
Soil Sci., 1959, **88**: 172-8, bibl. 8.

In pot experiments with 8 different tropical soils, each treated to give a series of 7 levels of P saturation, maximal yields were obtained in danta (*Amaranthus gangeticus*) at 4·5–5%, in black gram (*Phaseolus mungo*) at 3·5–4%, and in lettuce at approximately 6% saturation. Corresponding saturations giving the most rapid growth were 3%, 3% and 4%.

703. Zink, F. W.
Spiraled heads in lettuce.
Calif. Agric., 1959, **13**(10): 6, 8, illus.

See *H.A.*, 29: 3665.

704. Cleary, J. P.
Bacterial wilt disease of lettuce.
Ann. appl. Biol., 1959, **47**: 370-2, bibl. 12.

The causal organism of a wilting disease found in glasshouse lettuce crops in northern England is thought to be *Pseudomonas marginalis*, though certain characteristics are atypical. The comparative absence of *Botrytis cinerea* in the affected plants is attributed to the antagonism of the wilt bacterium.—N.A.A.S., Leeds.

705. Carlson, E. C.
Control of *Macrosiphum barri* Essig and its damage to lettuce seed plants.
J. econ. Ent., 1952, **52**: 411-14, bibl. 1.

Highly satisfactory (98–99%) control of lettuce seed stem aphids (*Macrosiphum barri*) and a marked reduction of infestation by *Tetranychus telarius* were given by applications, at about 2-week intervals, of 6 parathion sprays followed by 2 parathion (2%) dustings, and also by 6 demeton sprays followed by 2 dustings with mixed DDT and malathion. Lindane sprays followed by lindane +malathion dusts, or demeton sprays followed by lindane dusts, were only slightly less effective, and aphid control was lowest (81%) with parathion sprays alone. In no case was there adequate control of lettuce mosaic. The first treatment trebled seed yields and increased seed size and weight. Seeds from infested plants produced a smaller percentage of normal seedlings, germinated more rapidly, and the seedlings showed much more 'red cotyledon' damage, than did seeds from aphid-free seed plants.—Univ. Calif., Davis.

706. Dickson, R. C., and Laird, E. F., Jr.
California desert and coastal populations of flying aphids and the spread of lettuce-mosaic virus.
J. econ. Ent., 1959, **52**: 440-3, bibl. 11.

The population of efficient vectors, mainly the green peach aphid, *Myzus persicae* (Sulz.), during the growing season determined the rate of spread of the lettuce-mosaic virus. A high population of the melon aphid, *Aphis gossypii* Glover, did not cause measurable spread, even though this insect was shown to be a fairly good vector of lettuce-mosaic virus in the laboratory. The lettuce seed-stem aphid, *Macrosiphum barri* Essig, was shown to be an efficient vector in the laboratory. [Authors' abstract.]—Univ. Calif., Riverside.

Mushrooms.

(*See also* 450.)

707. McCarthy, G. J. P.
Growing mushrooms in Queensland.
Qd agric. J., 1959, **85**: 227-35, illus.

Outdoor and indoor culture.

708. Kneebone, L. R.
High yielding mushroom from irradiated spores.
Science for the Farmer, 1959, **6**(4): 14.

In 2 trials Culture No. 286 derived from irradiated spores produced yields 20 and 21% greater than that from the control. Other new cultures were also promising. The method of irradiation involved exposing plated spore suspensions for 40 min. at a distance of 6 in. under a Uviare germicidal lamp, which produces ultra-violet light, but gamma and thermal neutron irradiations are also to be tried.

709. Kneebone, L. R., and Merek, E. L.
Brief outline of and control of mushroom pathogens, weed moulds, indicator moulds and competitors.
M.G.A. Bull., 1959, No. 113, pp. 146-52, No. 114, pp. 190-4, No. 115, pp. 226-8, illus.

710. Bonomi, F., Serini, G., and Giraldi, G.
Disinfestazione di funghi secchi mediante bromuro di metile in atmosfere artificiali. **(Disinfestation of dried fungi with methyl bromide in artificial atmospheres.)**
Progr. agric., 1959, **5**: 917-20, illus.

Insect pests of dried edible fungi were very effectively and economically controlled by fumigation with methyl bromide at 30 g./cu.m. The pests in this instance were the moth *Nemapogon* (*Tinea*) *parasitella* and various flies and beetles.

Okra.

711. Boswell, V. R., and Reed, L. B.
Okra culture.
Leafl. U.S. Dep. Agric. **449**, 1959, pp. 8, illus.

Supersedes *Leafl.* 305 and covers varieties, soils, seed treatment, culture, harvesting and uses.

Onions and garlic.

(*See also* 211, 269, 573, 582-589.)

712. Yen, D. E.
American hybrid onions in New Zealand.
N.Z. Comm. Gr, 1959, **14**(11): 6, 7, 9.

During the last 4 seasons 29 U.S. hybrid onions grown from seed have been tested. None has proved superior in yield, storage ability or absence of bolting to the standard variety Pukekohe Long Keeper.—D.S.I.R., Otahuhu, N.Z.

713. Corrales Macedo, A.
Comparativo de variedades de cebolla en Ica. (**Comparison of onion varieties in Ica [Peru].**)
Bol. trim. Exp. agropec. P.C.E.A. Lima, 1958, **7**(3): 8-11.

Of the 5 onion varieties tested, Nacional o Arequipeña and Texas Early Grano proved the most suitable under the local conditions of comparatively long days and high salt content of the soil.

714. Corrales Macedo, A.
Costo económico de la producción de semilla botánica de cebolla en el Valle del Rímac. (**Economic cost of producing onion seed in the Valle del Rímac.**)
Bol. trim. Exp. agropec. P.C.E.A. Lima, 1958, **7**(4): 2-5, bibl. 1.

Commercial seed production in this locality is uneconomic, the main difficulties being high humidity and low light intensity. [For preliminary experiments see *H.A.*, 28: 458 and 3699.]

715. Průša, V., and others.
Zhodnocení československých odrůd cibule na podkladě chemických rozborů. (**Evaluation of Czechoslovak onion varieties on the basis of chemical analyses.**) [English, Russian and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 513-20, bibl. 3.

Chemical analyses, particularly determinations of moisture, sugar and allyl compounds, were found to be indicative of the grade and keeping qualities of onion varieties. Figures are given for 8 varieties and their value assessed thereon, the most valuable being Všetatska grown from sets. As there were pronounced regional differences in the results, the most suitable variety for a given area can be ascertained by this means.

716. Clark, J. E., and Heath, O. V. S.
Auxin and the bulbing of onions.
Nature, 1959, **184**: 345-7, bibl. 7.

Studies are described on changes in growth substance contents of onion plants during bulbing and on the effect of externally applied auxin on bulb development. Onion seedlings showed marked bulbing responses to long days and also to 3-indolylacetic acid applied externally in darkness. Bulbing responses increased with temperature from 15 to 25° C. Chromatographic studies of the natural auxin present during bulbing showed that it is likely to be 3-indolylacetic acid, and, if correct, this is one of the few cases yet cited of a morphogenic effect being associated with a known growth hormone.—Univ. Reading hort. Res. Labs, Shinfield, Berks.

717. Attia, M. S., Bahr, M. H., and Nassar, S. H.
Study on the effect of bulb size and some storage treatments on the seed yield of onions.
Agric. Res. Rev., Egypt, 1958, **36**: 506-14, bibl. 5.

Bulbs graded into large, medium and small sizes (6, 9 and 12 to the kg.) were stored either at normal room temperature or at 50° F. with high R.H. from Nov. 13 to Dec. 18, and then planted. The average number of shoots per plant increased with the size of the bulb and was significantly greater in the large bulbs stored at 50° F., and in the medium bulbs stored under either condition, than in the small bulbs. The small, cold-treated bulbs flowered slightly before the others, the large onions stored at room temperatures flowering the latest. Cold storage increased the number of open umbels per plant, the increase being positively correlated with the size of the bulb, but no effect on the seed yield per umbel was found. The large onions produced 38·2%, and the medium 27·3%, more seed per plant than the small bulbs.

718. Yakuwa, T.
Studies on tillering in the genus *Allium*. V. Some examples of abnormal leaves and abnormal tillering in the Welsh onion (*A. fistulosum*). [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 87-95, bibl. 6, illus.

719. Geard, I. D.
Diseases of onions.
Tasm. J. Agric., 1959, **30**: 165-9, bibl. 1, illus.

The control measures recommended are: white root rot (*Sclerotium cepivorum*), infected plants should be destroyed and the healthy transplants and soil treated with calomel; damping-off (*Pythium spp.*), sterilization of the seed bed with steam, chloropicrin or formalin; downy mildew (*Peronospora destructor*), destruction of infected plants and spacing of sowings to prevent carry over; neck rot (*Botrytis* spp.), harvesting in dry weather and proper ventilation in storage; basal rot (*Fusarium* sp.), crop rotation; and stem eelworm (*Ditylenchus dipsaci*), crop rotation and the avoidance of susceptible crops such as narcissi, hyacinths, tulips and bulbous irises.

720. (Goidànich, G.)
Avversità delle colture orticole. Cipolla. **(Pests and diseases of vegetables. Onions.)**
Progr. agric., **5**: 810-11, illus.

Symptoms, and brief notes on control, of: leaf nematodes (*Ditylenchus dipsaci*), mosaic virus, the beetle *Liliocerus merdigera*, downy mildew (*Peronospera destructor*), leaf spot (*Macrosporium* spp.), and beetles of the genus *Brachycerus*.

721. Checa España, J.
Algunos apuntes sobre el ajo. **(Some points concerning garlic.)**
Agric. trop. Bogotá, 1959, **15**: 176-8.

In the region of Colombia concerned, garlic is planted after a single ploughing, followed by hoeing of fallow land. The beds are raised slightly, and spacing is usually closer than the optimal 15 × 8 cm. Ashes of wood and coal are watered in as fertilizers at planting, i.e. usually in April and August, and 2, or even 3 harvests are collected annually. The bulbs are left to dry for a week in the wind, and then their tops are plaited into bundles for storage. Cloves from outside the bulbs are recommended for planting.

722. Billah, M. M. el-M.
Effect of some chemical and mechanical treatments on the germination of the clovelets of the Italian white variety of garlic.
Agric. Res. Rev., Egypt, 1958, **36**: 443-58, bibl. 13, illus.

As a result of 4 experiments it was found that 70% of the clovelets of the Italian variety would germinate, that germination was slow and that 60% of them produced single bulbs. Germination could, however, be speeded up by removing the coats, storage at 4° C. and soaking in 1% thiourea for an hour before planting.

723. Attia, M. S., and Soliman, A. F.
Effect of irrigation and clove size on germination and yield of the Italian white variety of garlic.
Agric. Res. Rev., Egypt, 1958, **36**: 459-62, bibl. 3.

Percentages of germination after 52 days for large, normal and small cloves were 93·91, 81·72 and 48·31 respectively. Twice-weekly irrigation increased the germination of all sizes of cloves by 20–30%, and yields by 40%, compared with weekly watering.

724. Yamada, Y.
Studies on the breeding of *Allium*. I. On the types of propagation in *Allium*. II. On the formation of division-bulbs and the differentiation of flower buds in Baker's garlic *(Allium bakeri* Regel). [Japanese, with English summary.]
Agric. Bull. Saga Univ., 1957, No. 6, pp. 35-60, illus., from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 34,927.

Plants of Kyoto and Fukuoka grew more rapidly in greenhouses maintained at 10–25° C. than they did out of doors. The formation of division bulbs was traced over a 7-month period. The first daughter-bulbs were formed in the axil of the third leaf sheath of the mother bulb. Subsequent bulbs were formed at intervals of 1–2 leaves. This regularity of daughter bulb formation persisted in secondary (grand-daughter) bulb formation. The number of bulbs formed was greater in the greenhouse plants. Blind flowers appeared to be caused by high temperature and drought during critical stages of flower differentiation.

725. Tomašević, B.
Lukova grinja (*Rhizoglyphus echinopus* F. and R.). ***(Rhizoglyphus echinopus*, a mite on garlic.)**
Zasht. Bilja, 1958, No. 49/50, pp. 151-6, bibl. 6, illus.

Attacks are worst when garlic is grown in swampy or over-watered soils, particularly those to which insufficiently rotted dung has been added. Good control was obtained by treating infested bulbs during the winter with carbon disulphide, using 200 g./cu.m. at 17° C. for 24 hours.—Inst. Plant Prot., Belgrade.

Rhubarb.

(*See also* 910.)

726. Wiebe, J.
Rhubarb forcing.
Circ. Ont. Dep. Agric. **346**, 1959, pp. 5.

Buildings, techniques and varieties.

727. Kursanov, A. L., Brovčenko, M. I., and Parijskaja, A. N.
The flow of assimilates into the conducting tissues in rhubarb *(Rheum rhaponticum)* leaves. [Russian, with English summary ½ p.]
Fiziol. Rast., 1959, **6**: 527-36, bibl. 11, illus.

After rhubarb leaves had been exposed for 2 minutes to light in an atmosphere containing

$C^{14}O_2$ the labelled carbon was found in sugars, amino acids, organic acids and certain unidentified metabolites in the ratio 70 : 7 : 6 : 17. Sucrose was the first compound to be identifiable, and was selectively translocated. Of the organic acids, malic and citric acids were the first to be translocated, whereas fumaric, succinic and oxalic acids did not become mobile during the early stages. Among the amino acids, alanine and serine were the most radioactive, but threonine was more readily translocated; aspartic acid, proline and occasionally γ-aminobutyric acid showed little movement.

Root crops.

(*See also* 11, 65, 211, 443, 531, 533, 534, 573, 588-591, 628, 957, 1164.)

728. Davis, J. F., Shepherd, L. N., and Lucas, R. E.
Long term effects of phosphate and potash applications to organic soils: 1. Carrots, potatoes and table beets.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 762-7, bibl. 2.

While the annual variations in yield and in the response to K were large, these crops (on peaty soil) responded more to K than to P, although the response of beets to P was greater than that of carrots. P alone tended to reduce yields and to intensify K deficiency. Soil extracts obtained by 8 volumes of 0·018 N acetic acid gave reasonable estimates of the available plant food and the amounts used by plants. Adequate annual dressings of K and P levelled up the yields from soils of widely varying fertility.

729. Sagajdak, I. N.
Increasing the quantity of pigments in beet leaves by grafting. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1959, **126**: 1375-7, bibl. 14, illus.

When an additional root of sugar beet was grafted into the upper part of the root of a table beet and *vice versa*, the content of a + b chlorophylls was increased in the leaves. The effects of grafting on the dry matter content of the leaves and on the weight and sugar content of the roots were also noted.

730. Carlson, E. C.
Lygus on vegetable seed crops.
Calif. Agric., 1959, **13**(11): 7, 9.

Preliminary field experiments showed DDT-Dylox to be an effective substitute for DDT in the control of *Lygus hesperus*, without causing a build-up of red spider or a reduction in honeybee populations. In a field trial with a beetroot seed crop the DDT-Dylox treatment gave the best control of lygus bugs and the highest seed yield, but it was toxic to spider mite predators. DDT-DiSyston was comparable with DDT-Dylox for bug control and was less toxic to the mite predators; however, seed yields were smaller and seed viability following DDT-DiSyston treatment was very low. Thiodan, DDT-Trithion, toxaphene and DDT-toxaphene also gave satisfactory control of lygus bugs, as well as increases in seed yields. [See also abstract 733.]—Univ. Calif., Davis.

731. Ward, K. M.
Living space for carrots.
Qd agric. J., 1959, **85**: 257-61, illus.

Carrots of the variety Topweight were grown at spacings ranging from 1 to 7 in. apart in the rows in trials over 2 years. Spacing at 3 in. gave the largest number of large carrots. Spacing at 2 in. gave the greatest yield of medium No. 1 grade carrots (average weight 5·9 oz.). Leaving the crop unthinned gave the maximum yield of small No. 1 grade (3·8 oz.) and No. 2 grade (2·9 oz.) carrots suitable for the pre-package and freezing trade.

732. Miyagi, K.
Experiments on carrot seed growing. II. Seed production of carrot varieties. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 115-22, bibl. 13.

Carrot varieties cultivated in the south of Japan showed earlier flowering, larger yields and better seed germination than did northern varieties. In general, germination was highest in seeds from primary umbels and lowest in seeds from tertiary umbels. Kintoki carrots produced the smallest seed yields and the lowest percentage germination of the native varieties of southern Japan. Oriental varieties were found to have a strong main shoot, a primary umbel with a large diameter, and weaker lateral shoots; western varieties had a spreading habit with well-developed lateral shoots and large secondary umbels. For high production of good quality seed collections should only be made from primary and secondary umbels, and tertiary umbels should be removed.

733. Carlson, E. C.
Evaluation of insecticides for lygus bug control and their effect on predators and pollinators.
J. econ. Ent., 1959, **52**: 461-6, bibl. 12.

In laboratory tests, in which caged carrot seed heads were used, DDT or toxaphene combined with Dipterex or malathion resulted in quicker lygus bug (*Lygus hesperus*) mortality and lasted longer than each insecticide used alone. Malathion or Dipterex alone were satisfactory, but did not last as long as DDT. Aircraft applications in fields of seed carrots showed DDT to be satisfactory for lygus bug control and not appreciably detrimental to bees. There was no build up of spider mites after using Dipterex, malathion or DDT. In these experiments DDT plus Dipterex was the only new treatment considered as a possible substitute for DDT or for toxaphene in lygus bug control. It significantly increased mortality over that caused by DDT, and did not induce a build up of spider mites or reduce bee populations. The toxaphene-Dipterex, toxaphene-malathion and DDT-malathion combinations caused a spider mite build up and were also toxic to predacious insects. [See also abstract 730.]—Univ. Calif., Davis.

734. SCHMIDT, G.
Arbeiten über Rückstände von Pflanzenschutzmitteln auf oder in Erntegut. IV. Ergebnisse einiger Biotestversuche zum Nachweis von Insektizidrückständen. **(Studies on residues of plant protection materials on or in crops. IV. Results from bioassays to determine insecticide residues.)** [English summary 11 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 136-8.

Residues in radish and carrot roots were lower after broadcast applications of aldrin dust than after row treatment. Studies on radish extracts were, however, complicated by the presence of toxic mustard oils. Aldrin residues in carrots were higher after spraying than after dusting, but there were no residues following seed dressing with aldrin. Residue toxicity in carrots was not affected by storage.—Inst. PflSchMittelforsch., Berlin.

735. EHLERS, M., AND LIEDTKE, G.
Weitere Untersuchungen zur Rückstandsfrage bei Gemüse. **(Further studies on the residue question in vegetables.)** [English summary 12 lines.]
NachrBl. dtsch. PflSchDienst, Braunschweig, 1959, **11**: 172-4, bibl. 4.

For the control of carrot fly aldrin was applied by seed pelleting, drilling with the seed, and spraying the plant rows. Residues determined at harvesting, after washing and after scraping the roots, were inversely related to root size (i.e. positively related to thinning). The lowest residues, confined to the, outermost tissues of the upper third of the root, were 0·05–0·27 p.p.m. from pelleting, and the highest were 0·5–2·0 p.p.m., with much greater diffusion down the root, from spraying. Dieldrin and lindane were applied only by seed pelleting. The latter left residues distinctly higher than those from aldrin applied by this method, and they were not so completely removed by scraping. [For earlier work see *H.A.*, 28: 3704.]—Hauptlab. Schering A.G., Berlin.

736. MOSEBACH, E., AND STEINER, P.
Arbeiten über Rückstände von Pflanzenschutzmitteln auf oder in Erntegut. V. Biologischer Nachweis von Aldrin- bzw. Dieldrin-Rückständen auf Radieschen und Möhren. **(Studies on pesticide residues on or in harvested crops. V. The biological estimation of aldrin and dieldrin residues in radishes and carrots.)** [English summary 15 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 150-5, bibl. 6.

The residues were determined by the *Drosophila* bioassay test after the radishes had been washed and some of the carrots scraped. The range of residues in radishes was 0·25–0·9 p.p.m., the values for seed treatment being markedly higher than those for soil treatment with sprays or dusts. Aldrin residues in early carrots ranged from 0·22 p.p.m. for seed treatment to 0·68 p.p.m. for soil spraying, and in late carrots all the values were low (0·2 p.p.m. or less). Scraping proved that residues of these insecticides, applied for the control of *Phorbia brassicae* and *Psila rosae*, were entirely confined to the skin of the carrots.—Lab. Zoöl. Mittelprüf., Braunschweig.

737. SAGAJDAK, I. N.
Vegetative hybridization of radish by grafting supplementary roots. [Russian.]
Agrobiologija, 1959, No. 3, pp. 453-5, illus.

Grafting extra roots of one radish type on to those of another type resulted in a diversity of root characters in the F_1 seedling progeny.

738. JAUHARI, O. S., AND PURANDARE, V. V.
Effect of planting of different root lengths of radish *(Raphanus sativus)* on seed raising.
Sci. and Cult., 1959, **25**: 256-8, illus.

In an experiment at the Government Agricultural College, Kanpur, ¾-length roots of radish significantly outyielded all other fractions in total and individual weights of seeds produced. Whole roots were slightly inferior in both respects.

739. HAGIYA, K., AND TAKAGI, T.
Studies on "pithy tissue" in root crops (VI). Effect of foliage sprays containing nutrient elements and growth regulators on the occurrence of "pithy tissue". [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 109-14, bibl. 56, illus.

Radishes sprayed 3 times with a foliar spray of a complete fertilizer showed the same degree of pithiness as untreated roots, although growth of tops and roots was better than those of plants receiving other treatments. The proportion of pithy tissue was reduced in radishes sprayed twice with 10 p.p.m. NAA, although root thickness remained about equal to that of untreated controls.

Foliar sprays of complete fertilizer plus 50 p.p.m. gibberellin were less effective than the fertilizer alone. Radishes sprayed twice with 10 p.p.m. TIBA made growth similar to that of the untreated controls, but the degree of pithiness was increased. Two foliar sprays of 70 p.p.m. MH increased pithiness, and produced smaller roots compared with the controls. It is concluded that the materials which reduced pithiness did so by an indirect improvement in the nutrient supply to the roots. [For part V, see *H.A.*, 28: 3715.]

740. Pyo, H. K.
A study of factors influencing pithiness in the radish *(Raphanus sativus* L.).
Diss. Abstr., 1959, **20**: 21, being *L.C. Card No. Mic.* 59-2367 of 60 pp.

A foliar application of sucrose and partial defoliation (up to 80% of the total leaf weight), made when radishes were enlarging rapidly, had no effect on the incidence of pithiness. Shading the plants to reduce light intensity decreased root size and decreased the severity of pithiness proportionally. It is concluded that pithiness in the field is not related to insufficient carbohydrate production but may be the result of intercellular competition for nutrients in the root. Radishes subjected to severe defoliation (more than 80%), soil moisture stress or high temperature storage, developed an abnormal type of pithiness, which probably resulted from carbohydrate depletion. Foliar applications of MH within 7 days of harvest did not check plant growth in the field, but inhibited regrowth of shoots and roots and slowed down the development of pithiness during storage.—Univ. Minn.

741. Šiškina, A. G.
The morphological-anatomical structure of the roots and the duration of day length in radish. [Russian.]
Agrobiologija, 1958, No. 6, pp. 136-7.

Reduction of day length caused proportionate reduction in the rate of ageing of radish roots.

742. Mewissen, F.
Scorsonère ou salsifis? **(Scorzonera or salsify?)**
Bull. hort. Liège, 1959, **14**: 326-8.

Characteristics and cultivation of the two plants in Belgium are compared.

743. Norman, T. N., and others.
Trials of calomel and chlorinated-nitrobenzene compounds for the control of club root.
Ann. appl. Biol., 1959, **47**: 364-6, bibl. 2.

Earlier trials were concerned with cabbages [see *H.A.*, 29: 3588]. This paper describes 3 trials on swedes. A greenhouse experiment in 1956 showed that coating the seeds with calomel dust or soaking them in 1/2,000 mercuric chloride solution reduced root infection by *Plasmodiophora brassicae* to less than 3% at the end of 2 months, whereas with Aldrex solution and aldrin dust the percentages were 41·6 and 28·9 respectively. In a field trial in 1957 seeds coated with their own or half their weight of calomel produced 44·5 and 48·5% of healthy plants and twice the yield of the control, whereas pentachloronitrobenzene preparations gave no significant reduction of infection and only a slight increase in yield. In 1958 a field experiment indicated that the calomel coating should be at least half the weight of the seed to ensure a significant reduction in infection and of equal weight to obtain a significant increase in yield.

744. Tasmania Department of Agriculture, Plant Pathology Division.
Precautions to be observed in the hot water treatment of seed.
Tasm. J. Agric., 1959, **30**: 106.

The failure of turnip seeds to germinate after hot-water treatment has been traced to inadequate subsequent drying. It was found that mixing incompletely dried seed with superphosphate practically destroyed its viability.

745. Army, T. J., and Miller, E. V.
Effect of lime, soil type, and soil temperature on phosphorus nutrition of turnips grown on phosphorus-deficient soils.
Agron. J., 1959, **51**: 376-8, bibl. 6.

Two soils, Georgeville silty clay loam and Bladen fine sandy loam, were used in pot tests to determine the interaction effect of liming and soil temperature on P availability. Turnips were grown as the test crop. Lime applications resulted in larger plants on both soils. Calculations of P uptake showed that a significant release of unavailable soil P was favoured by higher pH values and higher soil temperatures. [From authors' summary.]

746. Dorofeev, V. F.
Morphological and anatomical changes in some crucifers in relation to photoperiodism. [Russian, with English summary 7 lines.]
Izv. Timiryazev. seljsk. Akad., 1959, No. 2, pp. 217-24, bibl. 8, illus.

In turnips and kohlrabi the sequence of morphological changes under short-day (9-hour) conditions was similar to that under long-day (natural day-length) conditions, but with a delay of 10–15 days. This delaying effect of short-day treatment was most pronounced when applied to young seedlings, suggesting that biennial plants are most sensitive to optimum light conditions at the beginning of their development. Some anatomical changes caused by the short-day treatment are also described.

Spinach.

747. Verkerk, K., and Yadlin, E. V.
The effect of daylength, gibberellin, seed-vernalization and their interaction on spinach.
Neth. J. agric. Sci., 1959, **7**: 202-8, bibl. 9, illus.

Two varieties of spinach bolted quickly in long days, but neither gibberellin nor vernalization treatment had much effect. In short days bolting was delayed, and the gibberellin and vernalization treatments had a more pronounced effect. Growth was stimulated in all experiments by gibberellin. The response to vernalization increased as conditions favouring growth improved. The effect of each treatment was diminished when it was combined with either of the other treatments.—Lab. Tuinbouwpl., Wageningen.

748. Harding, J. A.
Tests comparing insecticides for the control of thrips on spinach.
J. econ. Ent., 1959, **52**: 540-1, bibl. 3.

Malathion, parathion, Guthion, Phosdrin, Dicapton and Perthane effective against thrips, principally *Frankliniella occidentalis.*

Sweet and red peppers and eggplants.

(*See also* 573.)

749. Oyolu, C.
***Capsicum* species of West Africa.**
Nature, 1959, **184**: 1163-4, bibl. 14.

Referring to the suggested species *C. sinense* [see *H.A.*, 29: 2600m] the author advances reasons for limiting the West African peppers to *C. annuum* and *C. frutescens.*—Minist. Agric., Umudike, Umuahia-Ibeku, Nigeria.

750. Posgay, E.
Fűszerpaprika termesztési kisérletek szántóföldi magvetéssel. (**Studies on the direct sowing of red pepper.**) [Russian and English summaries 1 p. each.]
Növénytermelés, 1959, **8**: 205-16, bibl. 14, illus.

Experiments were instituted to develop a satisfactory mechanical technique for the direct sowing and cultivation of red pepper. Seed vernalization proved essential for rapid emergence and development, and it also promoted greater adventitious root formation. In the drill used the spout was preceded by a blade which removed the uppermost dry soil, thus avoiding deep sowing. Subsequent cultivation of the young crop filled the drills and covered the basal 3–4 cm. of the stems. By these means yields were produced comparable with those from a crop transplanted by hand.—Res. Inst. Irrig. Rice Breeding, Szarvas.

751. Szöke, T.
Le piment, *Capsicum annuum* L. (**Red pepper, *Capsicum annuum.***)
Bull. hort. Liège, 1959, **14**: 318-25, illus.

The calorific value and contents of carbohydrates, vitamins (carotene, B_1, B_2, C), Fe, Ca and P of the fruit are given. The vitamin C content is reduced by indoor cultivation, close spacing and irrigation. Flowering, which requires long days, is advanced by artificial lighting as an extension to natural daylight, but is not achieved when artificial light only is supplied for 12 hours daily. Cultural methods used in Belgium are described, including growing under glass, growing for seed and the control of fungus diseases.

752. Foschi, S.
Avversità delle colture orticole. Peperone. (**Pests and diseases of vegetables. Capsicums.**)
Progr. agric., 1959, **5**: 1060-1, illus.

No curative treatment has been devised against tracheomycosis of capsicums, caused by *Verticillium* and *Fusarium* spp., but most of the fungicides in current use are effective against *Alternaria solani.* The bug *Aelia rostrata* is controlled by applying contact insecticides. Rotting of the fruit tips can be avoided by ensuring moderate and regular supplies of N and moisture.

753. Hare, W. W.
Milk is found useful in virus disease control.
Miss. Fm Res., 1959, **22**(3): 1, 4.

The inoculation of pepper and tomato plants with tobacco mosaic virus through handling could be largely prevented by spraying the plants with milk or by repeatedly washing the hands in milk. In experiments infection was reduced from 90–95% to 10% by this treatment.

754. Solymosy, F., and Szalai-Marzsó, L.
A fűszerpaprika újhitűségének epidemiológiai vizsgálata, különös tekintettel a levéltetűvektorok populáció-dinamikájára. (**Epidemiological studies on the so-called "Ujhitűség" disease of pepper (*Capsicum annuum* L.) caused by cucumber mosaic virus.**) [Russian and English summaries 1 and 1½ pp.]
Növénytermelés, 1959, **8**: 145-56, bibl. 23, illus.

These studies in field and laboratory extending over 3 years have established the vectors to be *Myzus persicae*, *Aphis nasturtii* and, to a lesser extent, *A. craccivora.* In 1958 on small plots sprayed with 0·1% Metasystox the incidence of virus infection was reduced by only 50%, suggesting re-infestation from surrounding plants and the need for treating larger areas. Heavy rainfall and low temperatures in May reduced infestation. Certain predators were active in 1957 and 1958, but are not considered adequate for satisfactory biological control.—Res. Inst. Plant Prot., Budapest.

755. Maždrakov, P., and Najdenov, A.
Studies on the oxalate content of solanaceous vegetables. [Bulgarian, with Russian and German summaries.]
Izv. Inst. Biol. "Metodij Popov", BAN, 1958, **9**: 157-65, bibl., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 79.

Low oxalic acid content desirable in selection of eggplants, peppers and tomatoes.

756. DEZEEUW, D. J., AND BURTON, C. L.
Soil treatments in relation to *Verticillium* wilt of eggplant.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 848-52, bibl. 2, illus.

In rather inconclusive experiments in 1957 and 1958 chloropicrin appeared to exercise some control over the wilt caused by *V. albo-atrum*, as also to a lesser extent did urea-formaldehyde, although the nutrient action of the latter tended to mask the disease control effect.

757. LALL, B. S., AND DUTTA, C. P.
On the biology of the red spider mite *Tetranychus telarius* (Linn.), Acarina: Tetranychidae.
Sci. and Cult., 1959, **25**: 204-5, bibl. 7.

In experiments using cultures of the mite on leaves of various plants, including eggplants, Aramite 15 W had a quick knockdown effect but very little residual action. Malathion at 0·02% and Folidol at 0·03% afforded protection which lasted for 2 weeks.—Bihar agric Coll., Sabour (Bhagalpur).

Tomatoes—general.

(*See also* 255, 755.)

758. CARNCROSS, J. W. (EDITOR).
American tomato yearbook, 1959.
C. Stedman Macfarland, Jr, 8 Elm St., Westfield, New Jersey, 1959, pp. 40, sub. price $2.

The yearbook is packed with information for anyone, particularly in the U.S.A. or Canada, concerned with growing, marketing or processing tomatoes. It lists associations in these countries actively interested in improving the tomato industry, and relevant periodicals including 2 from Britain. Prof. C. H. Nissley contributes an article on tomato growing. Bibliographies are provided on tomato culture in the U.S.A., and on tomato diseases and pests and their control. Other information includes: grade requirements for canning and processing; production and trade; agricultural experiment stations with directors' names; tomato research workers in each American State and Canadian Province; booklets and pamphlets; boxes for shipping tomatoes; recommendations on materials, machinery and equipment; and fresh market varieties suitable for different areas.

Tomatoes—breeding and varieties.

759. SZTEYN, K.
Trials to overcome the incompatibility of crosses between *Lycopersicum esculentum* and *Lycopersicum glandulosum* by repeated grafting. [Dutch summary 10 lines.]
Euphytica, 1959, **8**: 145-50, bibl. 29, illus.

In breeding tomatoes for resistance to "corky root", repeated reciprocal grafting (by the approach method) between tomato and *Lycopersicum glandulosum* did not increase interspecific fertility.—I.V.T., Wageningen.

760. LAMBREV, Ž.
Vegetative hybrids of plum-shaped and pear-shaped tomatoes. [Russian.]
Agrobiologija, 1959, No. 3, pp. 416-18.

Further evidence that vegetative hybrids are easily produced and resemble those produced sexually.

761. WILLIAMS, W.
Heterosis and the genetics of complex characters.
Nature, 1959, **184**: 527-30, bibl. 13.

In three F_1 tomato hybrids heterosis was manifested in yield, but not in flower production, earliness of flowering, average weight of fruit, or number of fruits per plant. In certain other tomato crosses the F_1 hybrid exceeded each parent in number of fruits per plant. Where the parents showed high values for either yield or fruit number, however, the F_1 hybrids were inferior to the better parent. The best varieties achieve maximal yields by possessing optimal values of both yield components, i.e. fruit number and fruit weight, and there can be no advantage in changing the factor for either of these from the homozygous to the heterozygous state.—John Innes hort. Inst., Bayfordbury, Hertford.

762. HENDERSON, W. R.
Cause and mode of inheritance of male sterility in four mutants of tomato *(Lycopersicon esculentum* Mill.).
Diss. Abstr., 1959, **20**: 462-3, being *L.C. Card No. Mic.* 59-2741 of 166 pp.

763. ANON.
Bigger yields from Hawkesbury hybrid tomatoes.
Banana Bull., 1959, **22**(6): 7.

Three new hybrids from the Hawkesbury Agricultural College gave average yields 30% above those of Grosse Lisse and Rouge de Marmande.

764. STRYDOM, E.
New tomato variety for High- and Middleveld.
Fmg S. Afr., 1959, **35**(6): 14-15, illus.

Red Kaki (introduced from France) shows vigour, good yields, a relatively low percentage of catface and cracked fruit, is attractive in appearance and remains firm during transport.—Hort. Res. Stat., Pretoria.

Tomatoes—cultural practices.

(*See also* 19, 112, 533, 538, 573.)

765. Brown, A. L., Jurinak, J. J., and Martin, P. E.
Plant growth as affected by ethylene dibromide fumigation of soils at two moisture levels.
Proc. Soil Sci. Soc. Amer., 1959, **23**: 311-13, bibl. 7.

Ethylene dibromide (EDB) was injected into Yolo loam, Yolo clay, and Staten peaty-muck at two moisture levels (air-dry and field capacity) at rates of 0, 0·01, 0·02, 0·05, 0·1, 0·5, 1·0, and 5·0 ml. per crock. The soils were allowed to stand for 2 weeks before transplanting tomato seedlings into them. The moisture level was then maintained adequate for growth. The phytotoxicity of EDB was particularly marked in the air-dried soils, indicating greater retention of the fumigant vapour in the dry system as compared to the soils maintained at field capacity. The total Br taken up by the plants was generally greater from the moist soils than from the air-dry soils, although the concentration in the plants was in reverse order. The concentration of Br in the plant increased with increasing rates of EDB. Analyses of the soils for water-soluble inorganic Br indicated there was more soluble Br in the soils maintained at field capacity than in those kept air-dry. [Authors' abstract. See also *H.A.*, 29: 524.]—Univ. Calif., Davis.

766. Somos, A.
A paradicsom fejlődési idejének változása egyes időjárási tényezők és termesztési módok hatására. (**Changes in the growing period of tomatoes caused by climatic factors and methods of culture.**)
Magy. tud. Akad. Agrártud. Oszt. Közl., 1958, No. 1-3, pp. 1-36, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 20.

The sowing period for most vigorous growth was May, and that for the slowest growth was the autumn. When sown in the spring, varietal differences in rate of growth were insignificant. Early maturity was dependent on early sowing, and was aided by raising seedlings individually in small earth balls. Irrigation did not retard ripening, nor did heavy phosphate dressings hasten it. Growth substances applied to flowers advanced fruit maturity by as much as 12 days, and the removal of axillary shoots also helped.

767. Anon.
Yield—grade—quality relationships of market tomatoes as affected by cultural, harvesting and handling practices.
[*Mimeo. Publ.*] *Dep. Hort. Univ. Ill., Urbana*, 1958, pp. 17.

Yield and quality studies on tomatoes were made at 4 locations in Illinois over 2 seasons. Harvesting at the mature green stage gave a higher marketable yield, and the fruit had less cracking but more scarring, than harvesting at the turning or pink stages. Unstaked plants gave higher early and total yields than unpruned, staked plants. The staked plants produced a high percentage of misshapen fruits and of fruits with internal browning. Paper mulching increased early and total yields and improved grade. Total soluble solids decreased towards the end of the harvest season. Fruits on plants showing internal browning were found to be low in soluble solids.

768. Laub, R.
Anhäufeln bei Tomaten. (**Earthing up of tomatoes.**)
Taspo, 1959, **88**(11): 13, from abstract in *InformDienst Weihenstephan*, 1959, No. 7/8, p. 98.

Earthing up of tomatoes, when the plants were about 10 cm. high, controlled weeds, enhanced the development of adventitious roots and reduced stem rot (*Didymella lycopersici*).

769. White, A. W., Jr, Giddens, J. E., and Morris, H. D.
The effect of sawdust on crop growth and physical and biological properties of Cecil soil.
Proc. Soil Sci. Soc. Amer., 1959, **23**: 365-8, bibl. 16.

Yields of tomatoes and lima beans were not significantly affected by incorporating 5·4 tons of pine sawdust into the soil per acre. When the sawdust was applied as a mulch at 18·7 or 20 tons per acre it increased total yield, fruit size, and yield of marketable fruit in tomatoes, and also the yield of lima beans. The yield responses are attributed to the conservation of soil moisture and to the soil cooling effect of the mulch. Soil nitrate content was reduced by the sawdust, whether used as mulch or ploughed in. Soil micro-organism populations were increased by incorporating the sawdust, but an expected increase in the mulched plots was not observed.

770. Galstjan, A. Š., and Avakjan, A. G.
Changes in physiological activity of tomato roots caused by topping. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **126**: 1365-7, bibl. 3.

The soil used for pot-grown tomatoes was either untreated or supplied with 1 of 4 NPK fertilizers, and the test plants were topped as soon as ripe fruit appeared by removing the growing points from the main-, replacement- and 3 side shoots. Root respiration rates were determined 10 and 40 days later, the latter date coinciding with harvesting. The first investigation showed an increase in respiration rate due to topping, particularly for the feeder roots in the top 10 cm. of soil. Invertase activity of the roots was also increased. Topping increased yields in all cases, but its stimulating effect on root respiration persisted in only 3 of the 5 treatments. The final values for root respiration rates in both topped and untopped plants were inversely related to yield as affected by fertilizers. The highest yield was obtained by using 1 g. of N, 7 g. of P and 1 g. of K per kg. of soil, but the increase resulting from topping was greatest with twice these amounts of nutrients.

771. Kovačev, I.
Changes in the growing points of tomatoes. [Bulgarian.]
Ovoščarstvo i Gradinarstvo, 1958, No. 11, pp. 34-5, illus., *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 76.

Very severe pruning induced proliferation of flower trusses and caused them to develop from axillary shoots.

Tomatoes—environment and nutrition.

(*See also* 50, 55, 73, 77, 205, 520, 770, 796.)

772. Calvert, A.
Effect of the early environment on the development of flowering in tomato. II. Light and temperature interactions.
J. hort. Sci., 1959, **34**: 154-62, bibl. 9.

The number of leaves produced before the first nflorescence ("leaf number") was influenced by the intensity of photosynthetic light, high light ntensities causing low leaf numbers and *vice versa.* No major differences in leaf number occurred in plants grown in light periods of 8 hrs and 16 hrs at comparable intensities. By periodic dissections of the apex, the rate of leaf production and the mean date on which first signs of flower differentiation occurred were obtained for a range of environmental conditions. Signs of flowering were observed as early as 16 days from cotyledon expansion (1,000 lumens/ft.^{2} at 59° F.) and as late as 45 days (250 lumens/ft.^{2} at 77° F.). The rate of leaf production increased with the light intensity, but leaf number decreased. The rate of leaf production increased with temperature, and leaf number also increased. The number of leaves formed in advance of the first inflorescence was ncreased when portions of the cotyledons were removed immediately after cotyledon expansion. Leaf and flower numbers were not affected by 0% and 20% sucrose solutions sprayed on to the cotyledons daily for 20 days from cotyledon expansion. [Author's summary. For part I see *H.A.*, 27: 1550.]—John Innes hort. Instn, Bayfordbury, Herts,

773. Wedding, R. T., and Vines, H. M.
Temperature effects on tomato.
Calif. Agric., 1959, **13**(11): 13, illus.

The development of tomato fruits after a spray of 50 p.p.m. 4-CPA was studied in glasshouses with 3 temperature regimes, viz. 86° F. during the day with 59° F. at night, 77° F. with 59° F., and 68° F. with 50° F. There was a definite and significant tendency for the hormone-set fruits at the lowest temperatures to be more pointed, but with a lower percentage of puffiness, than fruits grown at higher temperatures. There was no fruit cracking or blossom-end rot in the cool-house plants, and only small amounts of such fruits were produced at higher temperatures.—Univ. Calif., Riverside.

774. Ribaldi, M.
Singolare effetto di una vernice su colture di pomodoro in serra. (**Unusual effect of varnish on greenhouse tomato crops.**)
Rev. Ortoflorofruttic. ital., 1959, **43**: 269-75, bibl. 12, illus.

Fumes from a varnish used in painting a greenhouse scorched the cotyledons and caused discoloured patches in adult leaves of Marmande tomatoes, resulting in the ill health of the plants. Similar symptoms were induced experimentally in cucumber.

775. Korbonits, A.
A paradicsom tavaszi és nyári műtrágyázásának kérdéséhez. (**Fertilizer application to tomatoes in spring and summer.**)
Konzerv és Paprikaipar, 1958, No. 5-6, pp. 106-10, from *Hung. agric. Rev.*, 1959, Abstr. 123.

In trials on dry sandy soils full fertilizer dressings in the nursery stage increased total dry matter by 20–25% even when manure had been applied in the autumn. N had the greatest effect and K the least. With inadequate rain, only the percentage of dry matter increased, whereas with sufficient rain the total yield also increased. Top dressings during flowering and fruit formation increased yields when rainfall was sufficient, but full fertilization retarded ripening in a dry season.

776. Flocker, W. J., Lingle, J. C., and Vomocil, J. A.
Influence of soil compaction on phosphorus absorption by tomato plants from an applied phosphate fertilizer.
Soil Sci., 1959, **88**: 247-50, bibl. 11.

Increasing the bulk density of a clay-loam soil from 1·3 to 1·5 (g. per c.c.) decreased the average fresh weight of tomato plants grown for 6 weeks without P fertilizer, and reduced the response to 200 lb. of P_2O_5 per acre, but had little effect on the response to half this rate of fertilizer. Plants growing in a fine sandy loam without fertilizer produced progressively less fresh weight at the series of densities 1, 1·3 and 1·6. They did not respond to P at either the 100 or 200 lb. rate at the lowest soil density. Apart from this, the response increased with application rate and decreased with increased compaction. Plants growing in a coarser sandy loam showed a very marked increase in fresh weight with a soil density increase from 1 to 1·3 (183% without fertilizer). Further compaction to 1·6 without added P gave fresh weights amounting to 143% of those at density 1, but the response to P was not significantly affected. Uptake of P by the plants in both sandy loams was greatest at a soil density of 1·3 and with the high P application, and the effects of both P application rates were reduced by further compaction. The single increase of density in the clay-loam soil gave similar results.

777. Veress, S., and others.
Contribuţiuni la studiul ingrăşării extraradiculare a tomatelor în sera. **(A study on the foliar nutrition of glasshouse tomatoes.)** [English, Russian and Hungarian summaries 1 p. each.]
Lucr. şti. Inst. agron. "Dr. Petru Groza", Cluj, 1958, **14**: 217-27.

When the ordinary nutrition of spring crops of the tomato varieties Early Delicatesse, Imerso and Zeelandia was supplemented by fortnightly foliar spraying with 0·25% potassium humate, the average yield increased by 15·63% over that of controls sprayed with water. Mineral NPK sprays gave a 12·83% average increase. In autumn cropping (with Zeelandia only) the increases were more marked, being 34·34% with the humate and 26·22% with NPK. Smaller increases resulted from sprays supplying NP or NK, but the latter combination with added ash extract was not greatly inferior to NPK.

778. Cervato, A.
Risultati del primo anno di esperienze sulla concimazione epigeica del pomodoro. **(Results for the first experimental year of foliar fertilizing of tomatoes.)**
Ann. Fac. Agrar. Univ. catt. S. Cuore, Milano, 1958, **66**: 72-82, bibl. 9, illus.

Supplementing the ordinary application of fertilizers to the soil by spraying tomato foliage with 1% solutions of various NPK fertilizers did not significantly increase yields, but where the $N : K_2O$ ratios of these solutions were 1 : 2 or 1 : 4 (i.e. with high K), the refractometric value of the fruit juice was increased.

779. McIlrath, W. J.
Absorption of nutrient ions by the tomato plant at various stages of development.
Proc. Ia Acad. Sci., 1956, **63**: 339-44, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 34,955.

Plants were grown in quartz gravel culture, and the uptake of Ca, Mg, N, P and K was determined by measuring the loss of ions from the nutrient solution. It was found that 2 distinct periods of accelerated absorption of all ions occurred during the developmental cycle. One followed the appearance of macroscopic floral buds, while the second occurred at the time of, and subsequent to, anthesis. A slight reduction in the rate of uptake of Ca and Mg was noted at about the time of floral initiation and a similar reduction was noted for P at the time of floral primordia formation. The greatest total quantity of ions were absorbed during the fruiting stage, with Ca, N and K being taken up in the greatest amounts.—Chicago Univ.

780. Sapetti, C.
Sulla distribuzione del fosforo nei vegetali. **(Distribution of phosphorus in plants.)**
Ann. Sper. agrar., 1959, **13**: 523-43, bibl. 7, illus.

Tracer experiments with P^{32} on tomato showed accumulation in the young parts, a high concentration in the flowers and young fruits, a greater concentration in the leaves than in the stem at a given height, a low concentration in the central, and a high concentration in the peripheral, part of stem and root, and a higher concentration in the seeds than in the other parts of the fruit. There was a slight progressive reduction of concentration in the lower part of the stem and the lower leaves with increasing height, with a minimum at about 20 cm. above the ground and an accumulation in the margins of leaves, even when these were fully developed.

781. Albert, L. S.
The effect of boron on the elongation and internal structure of tomato root tips.
Diss. Abstr., 1959, **20**: 39, being *L.C. Card No. Mic.* 59-1807 of 123 pp.

Root elongation of intact tomato plants grown in solution culture with an adequate supply of B (0·1 p.p.m.) was directly related to the sum of solar radiation in the experimental period of 24 hours, and was inversely related to the height of the plants at the start of the experiment. It was affected by changes in B concentration as slight as 0·001 p.p.m. Root elongation ceased and the tip turned brown 6 to 12 hours after the B supply was stopped. When B was withheld for 24 hours, apical dominance was reduced, and root elongation during this period was significantly and negatively correlated with the solar radiation of the first day of the experiment. When the supply was resumed the laterals began to elongate. Supplying B to one portion of a split root system did not promote root elongation in the portion receiving no B. Elongation of excised root tips grown in sterile culture in White's medium, without an added supply of B, was not inhibited during 17 days of growth. The inhibition of root elongation in intact plants when B was withheld was not alleviated by White's medium or by any of its components. It is suggested that some factor present in the top of the plant, different from carbohydrate and affected by light, may influence the response of tomato plants to a deficiency of B.—Rutgers Univ.

Tomatoes—diseases and pests.

(*See also* 443, 485, 753.)

782. Kerr, A., Edwards, G. R., and Wishart, R. L.
Tomato diseases in South Australia.
J. Agric. S. Aust., 1959, **62**: 365-76, illus.

This is the first of a series of papers which will be published later to replace an earlier bulletin. A key is provided for the identification of seedling, root, leaf and fruit diseases and those affecting the whole plant. The symptoms, spread and control of some fungal diseases are briefly reviewed.

783. Strong, M. C.
Fungicidal spray trials on tomatoes, 1957-8.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 853-8, bibl. 3.

As a result of these trials, a mixture of a water-insoluble copper compound and ziram or zineb at half the prescribed rates is recommended for the control of anthracnose, *Septoria lycopersici*, and both early and late blights. Dyrene and maneb at 3 lb. per 100 gal. are also suitable, and Phaltan is promising.

784. Grossmann, F.
Untersuchungen über die innertherapeutische Wirkung organischer Fungizide. III. Chinolin-Derivate und Captan. (**Studies on the internal chemotherapeutic effect of organic fungicides. III. Quinoline derivatives and captan.**) [English summary 15 lines.]
Z. PflKrankh., 1959, **66**: 385-91, bibl. 35.

The root treatment of tomato plants grown in sand with certain quinoline derivatives had no significant effects on *Fusarium oxysporum* f. *lycopersici*, *Alternaria solani* or *Phytophthora infestans*. Captan also remained systemically inactive against these diseases.—Inst. PflPath. PflSch. Univ. Göttingen.

785. Abdel-Samie, A. S., and Kamel, B.
Effect of recent fungicides on the control of late blight on tomatoes in Egypt.
Agric. Res. Rev., Egypt, 1958, **36**: 528-35, illus.

Spray treatments were applied 3 times at 10-day intervals, beginning at the first sign of infection by *Phytophthora infestans*. Copper fungicides reduced the percentage of infected plants from 95 to 10–15, their effectiveness increasing in the order: bordeaux, tribasic copper sulphate, and Perenox [mainly cuprous oxide]. Two zineb products gave even better control, Parzate leaving 7·5% and Dithane Z-78 only 5% of the plants infected, and both substantially increased fruit yields. Parzate and Fernide gave the best yields of uninfected fruit, but the latter fungicide was no more effective than bordeaux in checking plant infection.

786. Autry-Hall, F.
Trial fogging of winter tomatoes.
Banana Bull., 1959, **22**(5): 7.

Nearly an acre of Rouge de Marmande tomatoes was treated with cuprous oxide and salicylanilide at 7-day intervals using a fogging machine. Good control of late blight and other fungus diseases was obtained. The crop from fogged plants was greater and of better quality than from other plants in the district. The whole area was treated in less than one hour, whereas a normal bordeaux spray applied with power equipment took two men 1½ days.

787. Wilson, J. D., and Irons, F.
Disease control using air-blast sprayers.
Amer. Veg. Gr, 1959, 7(6): 9, 40-1, illus.

Maneb application with an air-blast sprayer satisfactorily controlled late blight and anthracnose infections on tomatoes. With the air-blast machine control of late blight varied from 98·6 to 99·2%, compared with an average of 98·8% when a fixed-boom hydraulic sprayer was used. The percentage of disease control in the rows by the concentrate sprayer decreased as the distance from the machine increased, and it is considered that a swathe of 36 feet is about the limit for satisfactory control. The percentage of anthracnose control obtained with the air-blast sprayer was also similar to that given by fixed-boom hydraulic applications.—Ohio agric. Exp. Stat., Wooster, and U.S.D.A., Toledo, Ohio.

788. Ferrer, J. B., and Owen, J. H.
***Botrytis cinerea* the cause of ghost-spot disease of tomato.**
Phytopathology, 1959, **49**: 411-17, bibl. 16, illus.

Studies were conducted on the causal agent and conditions required for the development of the ghost-spot disease of tomato fruits. Attempts to reproduce the symptoms by exposing tomato fruits to various environmental conditions and by mechanical injury produced evidence against a physiogenic cause. Inoculation of immature fruits with *Botrytis cinerea* produced symptoms undifferentiable from those occurring naturally in the field. Fruits inoculated with a spore suspension of *B. cinerea* and incubated 8–12 hours at 16–24° C. in the presence of high humidity formed necrotic specks similar to those found in the centre of ghost spots. If these fruits remained at this temperature and high humidity, the botrytis grey mould rot developed. If, after incubation at 16–24° C., fruits were left 6–24 hours at 30–35° C., a solid white disk often appeared around the necrotic spot, or if incubated at 38–40° C., the ghost-spot symptoms developed. Tomato fruits 1·5–3·0 cm. in diameter became heavily spotted when inoculated; those less than 1·5 cm. showed large necrotic areas; those larger than 3 cm. developed few or no ghost spots. Histological studies indicated that the halo surrounding the necrotic speck was formed by air spaces between the epidermal layer and the collenchymatous tissue. Stained tissue in the necrotic specks showed the presence of appressorium-like material, suggesting a penetration of the host by the fungus. Increase in the thickness of the walls of the epidermal cells was observed, as well as trichomal penetration by *B. cinerea.* [Authors' summary.]—Univ. Fla, Gainesville.

789. Elenkov, E.
Effective chemicals for spraying tomatoes against leaf mould *(Cladosporium fulvum* Cooke.). [Bulgarian.]
Selskostop Misăl, 1958, **3**: 833-40, from *Ref. Bjull. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 127.

Of 13 materials sprayed on to glasshouse tomatoes a 1% suspension of copper oxychloride plus a wetter gave the best control of leaf mould. This treatment reduced the number of leaf spots by 81·8–94·5% compared with the controls, and by 67·4–91·5% compared with a 1% barium compound used as a standard. The addition of thallium soap increased the efficiency of the barium spray.

790. Phillips, D. H.
The destruction of *Didymella lycopersici* Kleb. in tomato haulm composts.
Ann. appl. Biol., 1959, **47**: 240-53, bibl. 13.

The results of laboratory trials with agar cultures and infected tissue indicated that the fungus is destroyed when kept under moist conditions at 35° C. for 3–6 days, and thus would be eliminated in diseased haulms by careful composting.—States' exp. Stat., Jersey.

791. Selman, I. W., and Buckley, W. R.
Factors affecting the invasion of tomato roots by *Verticillium albo-atrum*.
Trans. Brit. mycol. Soc., 1959, **42**: 227-34, bibl. 11, illus.

In a sterile nutrient solution containing 200 p.p.m. of sucrose *Verticillium albo-atrum* invaded only the piliferous layer and lignitubers projected into the outer layer of cortical cells of seedling tomato roots. As sucrose concentrations increased, invasion by the fungus became deeper, and at 20,000 p.p.m. all root tissue including the xylem was invaded. Three levels of N did not affect fungal penetration. In non-sterile compost or sand the degree of invasion and lignituber production were comparable with that at 200 p.p.m. sucrose in the sterile nutrient solution. Rapid systemic invasion by the fungus followed damage to the seedling roots. Systemic infection did not normally follow soil watering with conidial suspensions.—Wye Coll., Univ. London.

792. Pegg, G. F., and Selman, I. W.
An analysis of the growth response of young tomato plants to infection by *Verticillium albo-atrum*. II. The production of growth substances.
Ann. appl. Biol., 1959, **47**: 222-31, bibl. 17.

Infected tomato plants showed marked increases in growth-promoting activity in stems and leaves.

793. Gäumann, E., Kern, H., and Obrist, W.
Der Einfluss einiger Welketoxine auf den Wasserhaushalt abgeschnittener Tomatensprosse. **(The effect of certain wilt toxins on the water economy of severed tomato shoots.)** [English summary 11 lines.]
Phytopath. Z., 1959, **36**: 111-21, bibl. 16.

The four wilt toxins were lycomarasmic acid, baccatin, culmomarasmin and skyrin.

794. de Charmoy, A. d'E.
La lutte contre la mouche des tomates. **(The control of tomato fly.)**
Rev. agric. sucr. Maurice, 1959, **38**: 179-82.

The campaign against the recently introduced *Pardalaspis cyanescens* is described. Spraying with DDT 50% w.p. at weekly intervals either on the tomatoes or on a specially planted intercrop of maize is proving effective.

795. Sauer, M. R., and Giles, J. E.
Nemagon and Vapam for the control of root knot of field tomatoes.
J. Aust. Inst. agric. Sci., 1959, **25**: 138-41, bibl. 4.

Plots treated with Vapam gave the highest yields, but only at a dosage rate too high to be economic (80 gal./acre). It was more effective in block than in row treatments. Both Nemagon, applied by various methods at about 1 gal./acre, and ethylene dibromide, injected at 20 gal./acre, gave adequate control and good yields. There was also a significant residual effect on yield with the last two nematicides. Nemagon was significantly less effective in single-row than in injection or block treatments, and block applications as high as 5 gal./acre did not reduce tomato yields. The final recommendation is annual double-row fumigation with about 1 gal. of Nemagon per acre.

796. Maung, O.
Effects of *Meloidogyne incognita acrita* and *Trichodorus christiei* on the nutrient levels of tomato.
From abstr. in *Phytopathology*, 1959, **49**: 524.

Sixty days after inoculation plants were harvested, and the tops and roots of each were separately analyzed for N, P, K, Ca, Mg, Na, reducing sugars, non-reducing sugar, and total sugar. Roots of plants having a root-knot index of 26–50 had significantly lower Na contents than roots of healthy plants. No other differences were observed in tops or roots at this infection level. Levels of N, P and K in the roots of plants having an index of 51–75 were significantly higher than those of the controls. Plants inoculated with 2,500 *T. christiei* tended to be deficient in the over-all nutrient level in both tops and roots, but differences were not significant. There was no difference in nutrient level in plants inoculated with 600 *T. christiei.* No difference was observed in sugar content, regardless of the rate of inoculation with either *M. incognita acrita* or *T. christiei.*

Tomatoes—fruit ripening, harvesting and marketing.

(*See also* 611.)

797. SPENCER, M. S.
Production of ethylene by mitochondria from tomatoes.
Nature, 1959, **184**: 1231-2, bibl. 4.

The method of preparing the mitochondrial suspension is described. No ethylene was detected from mitochondria from green tomatoes or those in the early ripening stages. Maximum production was from those in the $\frac{1}{2}$ to $\frac{3}{4}$ red stage; thereafter, ethylene production declined, thus following the pattern of ethylene evolution observed with whole fruit.—Univ. Alberta, Edmonton.

798. MACGILLIVRAY, J. H., ZAHARA, M., AND CLEMENTE, L. J.
Harvesting canning tomatoes.
Calif. Agric., 1959, **13**(11): 12-15, illus.

The time required for the last pick of the season was reduced to less than half, when the fruit was shaken on to a wheelbarrow screen instead of on to the ground. The screen, a coarse woven wire tray hinged in front to a one-wheeled frame, was provided with a pair of baffles forming a chute at this end for tipping the selected fruit into lug boxes. Other methods of reducing harvesting labour are briefly discussed.—Univ. Calif., Davis.

799. ÅVALL, H.
Packnings- och transportförsök med tomater. **(Trials on the packing and transport of tomatoes.)** [English and Esperanto summaries $\frac{1}{2}$ p. and $1\frac{1}{4}$ pp.]
Medd. Trädgårdsförs. Alnarp **115**, 1958, pp. 28, bibl. 9, illus.

The conventional method of packing tomatoes in wooden boxes, in 2 layers separated by corrugated paper, was found to be suitable only when the tomatoes were all of equal size. Otherwise the larger fruits were damaged by pressure. It was found that bruising could be avoided by bulk packing. Good results have been obtained from bulk packing in various types of corrugated fibre box. Choice of type is discussed.

800. AINES, R. O.
Tomato study shows importance of grading for profits.
N.J. Agric., 1959, **41**(3): 7-10, illus.

Price differences in New Jersey for No. 1 and No. 2 grade tomatoes.

TOBACCO.

Breeding and varieties.

(*See also* 834, 837, 867, 874, 878, 882.)

801. BREESE, E. L.
Selection for differing degrees of out-breeding in *Nicotiana rustica.*
Ann. Bot. Lond., 1959, **23**: 331-44, bibl. 11.

Initial observations on *Nicotiana rustica* suggested that the percentage of seed set by outcrossing might vary considerably in a segregating population and that this might be due to variation in the position of the stigma relative to the anthers in the corolla-tube. This, measured as the difference in level between the stigma and the ring of anthers, is termed *heterostathmy*, and the average expression of this character could be significantly altered by a short programme of selection. These structural modifications were accompanied by developmental modifications affecting the timing of anther dehiscence relative to the opening of the flower. Tests indicated that these changes significantly affected the rate of outbreeding. [Author's abstract.]—Genet. Dep., Univ. Birmingham.

802. LIGETI, L.
Nikotinban gazdag dohány szelektálására használt módszer. **(Method used to select tobacco with high nicotine content.)**
Dohánykut. Int. Közl., 1958, No. 1, pp. 12-15, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 14, and from *Tob. Abstr.*, 1959, **3**, Abstr. 907.

Plants for seed are selected in the field for high nicotine content by the Barta-Marschek's colorimetric method (reaction with brominecyan and β-naphthylamine). The selection is confirmed later by analysis of the dried leaf in the laboratory.

803. SUGGS, C. W., AND SPLINTER, W. E.
Physical properties of green Virginia-type tobacco leaves. Part I. Leaf dimensions, weight and midrib strength.
Tobacco, N.Y., 1959, **149**(7): 19-23, bibl. 2.

The mean values and ranges taken over 6 varieties and 3 breeding lines of normal, healthy mature leaves at 2 locations were as follows: Node spacing, 1·90 in.; 0·8–4·0 in. Weight per leaf, 52·76 g.; 20–95 g. Lamina weight per sq. in., 0·1467 g.;

0·1254–0·2203 g. Length, 20·36 in.; 14–25 in. Width, 12·13 in.; 9–16 in. Centre of gravity, 8·29 in. from stem butt; 6·0–10·2 in. Leaf angle, 52·23° at 2 in. from stalk; 24–98°. Leaf angle, 78·48° at 6 in. from stalk; 33–139°. Force to break midrib, 1·48 lb. downward; 0·5–3·0 lb. Force to break midrib, 2·28 lb. horizontal; 0·8–6·8 lb. Radius of curvature, 11·01 in.; 4·32–38·2 in. A regression of variety leaf weight on radius of curvature resulted in a non-significant slope value, indicating that varieties with larger leaves do not necessarily have greater curvature in the midrib. Similar regressions within the varieties did not give consistent results.—N.C. St. Coll., Raleigh.

804. Patel, G. C., Singh, M., and Das, R.
Natural variability and morphological classification of hookah and chewing tobaccos of North Bengal. I. Jati tobacco *(Nicotiana tabacum).*
Indian Tobacco, 1959, **9**: 39-53, illus.

The selection programme at the Wrapper and Hookah Tobacco Research Station at Dinhata started in 1955-56, and involved collecting samples of the tobaccos grown throughout North Bengal. From this material 13 morphologically distinct types have been isolated and are herein described.

805. U.S. Department of Agriculture.
Two new tobaccos.
Agric. Res., Wash., 1959, **7**(11): 16.

The black-shank-resistant, flue-cured varieties S.C.58 and N.C.73 released.

806. Street, H. K.
New high yield cigar leaf developed in Connecticut.
Tobacco, N.Y., **149**(4): 13-14, illus.

Connecticut All-Purpose is a long-season variety requiring 75–90 days of good weather. It is a binder type, extremely mild, and its yield has reached as much as 2,980 lb. per acre.

807. Toskov, N., and Spasov, K.
A new and reliable variety (line) of aromatic tobacco, Peruštica 2. [Bulgarian.]
Bălg. Tjutjun, 1958, **3**: 398-403, illus., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 69.

Of very good quality.

808. Oltványi, F., and Móger, J.
Debreceni dohányfajta egyes típusai értékének vizsgálata. **(Testing certain types of the tobacco variety Debrecen.)**
Dohánykut. Int. Közl., 1958, No. 1, pp. 21-9, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 15.

Comparisons between 4 strains.

Seeds and seed-beds.

(*See also* 853.)

809. Bunn, J. M.
Effect of temperature, moisture and light on the germination probability of Virginia type tobacco.
Thesis, N.C. St. Coll., 1957, illus., from *Tob. Abstr.*, 1959, **3**, Abstr. 894.

The optimum environmental conditions are: 70° F. temperature, 6,750 Å wave-length of light, and 10–30% by weight of soil moisture (13·5–0 in. of mercury soil-moisture tension). Environmental ranges are: 50–90° F. for temperature, 5% to a free water surface for soil moisture and a wave-length range greater than from 6,000 Å–7,500 Å. Germination response to temperature alone is parabolic and can be represented by the equation of a parabola that opens to the lower probability axis and has a vertex at about 70° F. Moisture effect on probable seed germination is hyperbolic for the lower $\frac{1}{3}$ of the effective range and is linear over the rest of the soil moisture range up to soil saturation. Wave-length effect on germination probability is independent of temperature and soil moisture. The full light spectrum is better for germinating seed than any small segment of it alone. Tobacco seed will germinate under water. The temperature effect on the time taken for seed to germinate is hyperbolic, with a minimum of 3–4 days occurring at temperatures of 80–90° F. Seed will germinate as well in darkness with daily alternating temperatures as with the optimum wave-length of light and a constant temperature. For daily alternating temperatures the time required for seed to germinate is about 2 days longer when irradiated with light for 24 hr. than when germinated in complete darkness.

810. Hashimoto, T.
Increase in percentage of gibberellin-induced dark germination of tobacco seeds by N compounds.
Bot. Mag., Tokyo, 1958, **71**: 430-1, from *Tob. Abstr.*, 1959, **3**, Abstr. 897.

Gibberellin induced the germination of tobacco seeds without light exposure, and this effect of GA was intensified to a large extent by the addition of potassium nitrate and ammonium nitrate.

811. Čirkovskij, V. I.
A method of overcoming the dormancy of freshly harvested tobacco seeds. [Russian.]
Sborn. n.-i. rabot. VITIM, 1958, No. 150, pp. 100-7, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,208.

Dormancy of freshly harvested tobacco seeds was not reduced by any of the following methods: scarification, cold treatment, desiccation, thermal radiations, heating in the sun for up to 10 days, or warm baths. The recommended method is to heat the seeds to a temperature of 25–30° C. at a R.H. of 60–70% for 2 weeks to 2 months, according to their stage of maturity [see also *H.A.*, 26: 2880]. To ensure uniform heating the seeds are spread in layers up to 2 cm. thick. With a humidity of 9% or less the seeds can be heated in bags (up to 40 kg.) provided they are spread out at the first sign of fermentation.

812. BERGER, P.
Heissluftbehandlung des Tabaksaatgutes. **(Hot air treatment of tobacco seed.)** [Russian and English summaries 19 and 18 lines.]
Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 47-60, bibl. 7.

Treatment of tobacco seeds in dry air at 90° C. and 120° C. for 1 hour destroyed all bacteria and fungus spores without affecting viability, but did not improve growth or yields. Seeds were damaged by treatment in dry air at 90° C. for more than 6 hours and at 120° C. for more than 2 hours, and also by treatment in moist air at 60° C. for 30 minutes.

813. PAL, N. L., GOPALACHARI, N. C., AND BHAT, N. R.
Improvement of germination of tobacco seeds by pre-treatment at low temperature.
Indian Tobacco, 1959, **9**: 65-7.

Tobacco seed held at 17·8° C. for 4 days before sowing showed a germination rate of 1,889 usable transplants per 100 sq. ft. of seed bed as against 1,086 for the controls. In other experiments the optimum period for low temperature treatment was 10 days, which raised the average number of usable seedlings by 50%. [See also *H.A.*, 28: 3808.]—Cent. Tob. Res. Inst., Rajahmundry.

814. VINOKUROVA, N. K.
Effect of cold treatment on germinating seeds. [Russian.]
Sborn. n.-i. rabot. VITIM, 1958, No. 150, pp. 109-14, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,209.

Makhorka grown in central Russia makes more growth, and therefore gives larger yields, when it originates from seed-beds prepared in autumn. Vernalization experiments are described, which indicate the value of cold treatment for several generations of makhorka seed.

815. SCARASCIA, G. T.
Anomalie in piante di *Nicotiana tabacum* L. derivate da semi trattati con neutroni termici. **(Anomalies in plants of *N. tabacum* grown from seed treated with thermal neutrons.)** [English summary ¼ p.]
Nuovo G. bot. ital., 1957, **64**: 137-44, bibl. 3, illus., [received 1959].

See *H.A.*, 29: 569.

816. SAJNANI, B. T., AND DHYANI, K. C.
Effect of rabbing and shading of nursery on growth and number of transplantable seedlings and yield of transplanted crop of hookah and chewing tobacco *(N. tabacum)*.
Indian Tobacco, 1959, **9**: 60-4.

In experiments carried out at the Hookah and Chewing Tobacco Research Station, Pusa, between 1954 and 1957, rabbing (burning before manuring and sowing) had no effect on either the number and development of transplantable seedlings, or on the yield and quality of the subsequent crop. Shading the seed-beds, apart from 2–3 hours' exposure each morning, resulted in a 70% increase in usable seedlings; it slightly retarded development but without affecting ultimate yield. Shading was most effective in an adverse season.

817. BONDAREV, V. P.
Raising [tobacco] seedlings in the winter. [Russian.]
Tabak, 1959, **20**(2): 56-8, bibl. 1.

On the southern shores of the Crimea tobacco seed was sown in cold frames from September to February for transplanting in early April. The best results were obtained when the seed was sown on December 19 under double-glazed frames and the seedlings transplanted on April 4. Air temperatures under the double glass were 2–4° and sometimes even 7° C. higher than under single glass. From sowing to seedling maturity the amounts of insolation, expressed as sunshine hours, required in all treatments were similar, i.e. 252 to 296 hours.

818. KISELIČKI, B.
The use of plastic in tobacco growing. [Bulgarian.]
Bălg. Tjutjun, 1958, **3**: 440-1, from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*), 1959, **4**, Abstr. 91.

Tobacco seedlings raised in beds under glazed frames or polythene film were ready for transplanting at various locations 4–13 days before those under mats. The quality of the planting material raised under the frames and polythene did not differ, but the plastic was cheaper and easier to handle.

Planting.

819. SPLINTER, W. E., AND SUGGS, C. W.
Mechanical transplanting of bright leaf tobacco. Part I. The effect of transplant size on survival and performance.
Tobacco, N.Y., 1959, **149**(5): 217-22, bibl. 4, illus.

Plant losses of small stocky plants (2 in. in height) ranged from 6% under ideal transplanting conditions to 38% for severe conditions and were 3–6 times greater than for medium (4 in.) or large (6 in.) stocky plants independent of variety or season. Differences in size of plants of the same type occurring when they were set in the field remained up to harvest, but even though the smaller transplants matured later, yields were not different. Tall slim transplants ($\frac{1}{4}$ in. stem diameter, 6 in. tall) when compared with stocky plants ($\frac{1}{2}$ in. stem diameter) of the same height suffered 2 to 3 times as many lost plants, were smaller in size just prior to harvest, and yielded fewer lb. of tobacco per acre. [From authors' abstract.]—N.C. St. Coll., Raleigh.

820. Šustrov, V. S.
Trials on the Oktjabr' state farm on square planting of makhorka. [Russian.]
Sborn. n.-i. rabot, VITIM, 1958, No. 150, pp. 184-90, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,216.

Results of experiments with the varieties Voronezhskaja 2 and Vysokoroslaja zelenaja 317 were as follows: (1) Square planting of one plant or more has a favourable effect on the growth and development of the plants. There is practically no difference between planting two seedlings in the same hole and planting them 5–10 cm. apart. Planting on the square does not depress the nicotine and citric acid content and results in better nourished leaves. (2) The provision of a mineral fertilizer, supplying N at 160, K at 110 and P at 110 lb. per acre, and of partially rotted manure at 1·6 tons per acre greatly increases yield without harming quality. (3) For both varieties spacings of 60 × 60 cm. with 2 plants in each hole are recommended for mechanical planting, and of 45 × 45 cm. with a single plant in each hole for hand planting.

821. Gigante, R.
Seccume delle piantine di tabacco causato da eccesso di illuminazione. **(The withering of tobacco seedlings caused by excessive sunlight.)** [English summary 9 lines.]
Tabacco, 1959, **63**: 3-12, bibl. 2, illus.

An account is given of the symptoms, both external and internal, and course of leaf withering, which developed in tobacco seedlings at the transplanting stage following exposure to strong sunlight.

Soils, nutrition and irrigation.

(*See also* 37, 551, 560-562, 833, 872, 874, 1211, 1432, 1482.)

822. Möller, C. A.
Better tobacco yields on grey loam and granite soils.
Fmg S. Afr., 1959, **35**(8): 22-3.

In the Brits irrigation region tobacco from grey loam and granite soils has shown better yields and quality than tobacco from other soil types. This is attributed, not only to soil type, but also to the fact that farmers on such soils plant more green manure crops and spend more on fertilizers.

823. Postiglione, L.
Sulla costituzione dei terreni coltivati a Bright in Italia. **(Composition of Virginia Bright soils in Italy.)** [English summary $\frac{1}{4}$ p.]
Tabacco, 1959, **63**: 56-82, bibl. 9.

Mechanical composition compared with that in other countries.

824. Kalekenov, D.
The effect of bacterial fertilizers on the yield and quality of tobacco. [Russian.]
Tabak, 1959, **20**(2): 54-6.

Bacterial fertilizers increased the leaf yields of the aromatic tobaccos Djubek 44 and 566. When azotobacterin and phosphorobacterin were applied separately, this increase was due to more leaves per plant, but when they were applied together, to more and larger leaves. Phosphorobacterin, both alone and in combination, improved quality, whereas azotobacterin alone slightly reduced it.

825. Hristozov, D.
Results of row applications of mineral fertilizers to tobacco. [Bulgarian.]
Selskostop. Misăl, 1958, **3**: 713-15, from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk. lesn. Hoz.*) 1959, **4**, Abstr. 60.

Three fertilizer treatments were applied to tobacco, namely, standard rates of NPK broadcast, half of these standard rates applied in the row and 100 kg./ha. of granulated superphosphate. The fertilizers, irrespective of rates, improved stand and advanced the full flowering stage by 10 days. The most vigorous root systems resulted from the row application of the half-standard rate. Yield increases from the standard rate broadcast and the half-standard rate applied in the row were about equal, but the former gave a quality index of 91·5 to 95% and the latter 101 to 106%. The superphosphate applied in the row also improved both yield and quality.

826. Olendskij, V. I., and Balanda, D. V.
Nitrogen nutrition of tobacco. [Russian.]
Sborn. n.-i. rebot. VITIM, 1958, No. 150, pp. 123-38, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,196.

In non-primed tobacco plants the N content of the whole plant increases for 40–50 days after transplanting, and then steadily decreases until the end of the vegetative stage. In primed plants the steady decrease of the second stage does not necessarily occur, and N may accumulate again as an effect of topping, picking of the lower leaves or of favourable climatic conditions in the autumn. The highest yields are associated with the protraction of the late period of N accumulation. N fertilizer is most effective at the time of the most active growth (from the 25th to the 50th day after transplanting). If applied in excess, N may cause an accumulation of protein N, adversely affecting leaf quality. The amount of N in the leaves increases from the bottom to the top of the plant. It is lower in leaves which develop at the time of blooming or in a period of rapid increase of dry matter. A lower yield results from a strong reduction of N nutrition of the plant after the 45th day following transplanting. Reduced N nutrition in the vegetative period depresses the N content of leaves; quality is then better but the yield much lower. A decrease in the N nutrition in the first 25 days has practically no effect on yield but favours a later increase in the N content of the leaves.

827. Maškovcev, M. F., and Koržina, A. N.
The effect of nitrogen nutrition on nicotine accumulation in tobacco. [Russian.]
Agrobiologija, 1958, No. 6, pp. 84-92, bibl. 8.

No difference in emergence was found when tobacco varieties of low, medium and high nicotine content were sown in frames on March 31 with PK and NPK. With NPK seedling growth was slow at first, but by May 28 it was about equal to, and 2½ weeks later better than, that following PK treatment. At the end of May the aerial parts of the NPK plants contained 11% less nicotine and the roots 30% less than the PK plants. By June 19, however, the nicotine content of the NPK plants was equal to that of the PK plants in the low nicotine varieties and greater than that of the PK plants in the high nicotine varieties.

828. Merker, J.
Untersuchungen über den Einfluss der Phosphorsäure-Düngung auf die Entwicklung, den Ertrag und die Qualität des Tabaks. **(Studies on the effect of phosphoric acid manuring on the development, yield and quality of tobacco.)** [Russian and English summaries ½ p. each.]
Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 5-46, bibl. 56, illus.

The effect of graduated P applications on tobacco was studied in the field (1956 and 1957) and in containers (1957). As a rule the development of tobacco was accelerated by increasing amounts of P, but responses varied with variety, soil and climatic conditions. On soils low in available P yields increased with increasing P applications, and the colour of the tobacco was also sometimes improved, though its other physical properties remained unaffected. The common belief that the leaves become brittle as a result of P manuring was not confirmed. Under suitable conditions higher P applications increased the sugar content of tobacco within certain limits, while reducing the N content. Sugar content is primarily a varietal characteristic, but it is also influenced by the position of the leaf on the stem, the method of curing, the soil and the climate. The following applications of superphosphate are recommended: For cigarette tobacco 500 kg./ha. applied to the previous crop or in the early autumn, and for cigar tobacco 300 kg./ha., both being additional to a moderate application of stable manure.

829. Takahashi, T., Yoshida, D., and Kono, K.
Studies on magnesium deficiency and the effect of magnesium fertilizers on tobacco. I to VIII. [Japanese, with English summaries.]
Bull. Hatano Tob. Exp. Stat. **42**, 1957, pp. 75, bibls, illus.

This bulletin consists of 8 separate papers as follows: 1. Nutritional interrelationship between magnesium and phosphorus [in sand cultures]. 2. Nutritional interrelationship between magnesium, potassium and calcium [in sand cultures]. 3. Studies on magnesium deficiency at each growing stage of the tobacco plant. 4. Chemical properties of soils in the magnesium-deficient tobacco areas. 5. Effect of magnesium in magnesian fertilizers. 6. Effect of phosphorus in magnesium-phosphatic fertilizers. 7. Influence of excessive applications of potassium to magnesium deficient soils. 8. Differences among tobacco varieties in sensitivity to magnesium deficiency. Each paper has an English summary of a few lines to half a page.

830. Kostjanew, S.
Tobacco fertilizing with the minor elements boron and manganese. [Bulgarian.]
Bălg. Tjutjun, Sofia, 1957, **2**: 390-2, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 59/301.

Boron applications at 7·3 kg./ha. increased yields by 4·5% in 4 years' studies. Yields were also increased by 4·1% when potassium manganate was applied at 14·6 kg./ha., but leaf quality was reduced. Higher rates of B and Mn were followed by reductions in yield. It is suggested that 1% B and 3% Mn might profitably be added to ammonium nitrate during its manufacture.

831. Walker, E. K.
Sprinkler irrigation of flue-cured tobacco.
Canad. Dep. Agric. Res. Fmrs, 1959, **4**(2): 3-4, 13, illus., from *Tob. Abstr.*, 1959, 3, Abstr. 1,002.

Under irrigation leaf thickness is decreased and leaf colour improved. Nitrogen and total alkaloid content is decreased and sugar content increased. Heavily irrigated tobacco is characteristically pale yellow in colour, harsh in texture and neutral in aroma. The amount of irrigation water should be in accordance with rooting depth of the crop and moisture-holding capacity of the soil. Thornthwaite evapotranspiration estimates are a satisfactory basis for scheduling irrigation requirements [see also *H.A.*, 28: 547].

832. de Beer, J. F.
Irrigate tobacco at wilting stage.
Fmg S. Afr., 1959, **35**(8): 23.

Tobacco grown in black turf was irrigated most profitably when the soil had reached the wilting stage. The nicotine content of plants irrigated at the wilting stage was higher than that of tobacco irrigated before wilting.—Cent. Tob. Res. Stat., Rustenburg.

Growth and reproduction.

833. Thorne, G. F., Jr.
Rate of growth studies on burley tobacco as affected by certain production practices.
Thesis, N.C. St. Coll., 1957, pp. 75, from *Tob. Abstr.*, 1959, **3**, Abstr. 744.

Nine-inch plant spacing produced tall spindly plants when fertility was high and short spindly plants when fertility was low. A plant spacing of 15 in. appeared most desirable. The amount of N available exerted a determining influence on plant response. P and K caused a negative response when present in inadequate amounts, but had little visible effect when present in high amounts. High amounts of available N in the presence of low amounts of K and P caused less growth response than did medium amounts of available N. No significant relationship was detected between the N and K contents of plant leaves and total crop yield. Leaf length was fairly strongly correlated with total yield of crop.

834. Muraoka, Y., Tokitsu, T., and Oka, M.
Varietal differences in the sensitivity of tobacco to day length under high and low temperatures. [Japanese.]
Jap. J. Breed., 1957, **7**: 24-30, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,137.

Experiments are described on 10 early or late varieties with 5 photoperiods (from 6 to 14 hours) at summer (23–30° C.) and winter (10–20° C.) temperatures. In all varieties, irrespective of temperature, flower buds appeared first in plants submitted to an 8-hour photoperiod. Flowering was delayed at high temperatures with longer photoperiods, and the longer the photoperiod, the longer the delay [see also *H.A.*, 28: 3810]. Three variety groups were determined according to their sensitivity to duration of the photoperiods.

835. Muraoka, Y., Tokitsu, T., and Oka, M.
The effect of temperature on flower-bud differentiation and flowering of Japanese tobacco varieties. [Japanese.]
Jap. J. Breed., 1957, **7**: 31-8, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,138.

Sixteen varieties of tobacco were studied. They were planted at 30-day intervals from April to August and grown under 8-hour light periods. Temperature had little effect on the number of days between the formation of the flower buds and blossoming, but it had an effect on the time needed for flower bud formation. Low temperatures reduced this time and also the number of leaves.

836. Solov'eva, V. M.
Contribution to the biology of makhorka flowering and fertilization. [Russian.]
Sborn. n.-i. rabot, VITIM, 1958, No. 150, pp. 115-22, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,130.

Makhorka pollen does not retain its vitality longer than 10 days in the most favourable natural conditions (dry atmosphere); in a desiccator over $CaCl_2$ it may be preserved for 2–2½ months. The makhorka pistil becomes receptive 6 days before the flowers open and remains receptive until 6 days afterwards, but at the beginning and end of the receptivity period the percentage of seeds forming in the capsules is rather low. As the female gametes of makhorka reach maturity before the males ones, the pollen of a flower can only effect fertilization during the last 4 days of the receptivity period. A comparatively low temperature (18–22° C.) and a high R.H. increase the number of seeds formed. This is highest if pollination happens on the day the flower is fully opened or 1–3 days before this. Young flowers (1–3 days before full bloom) are to be preferred if good quality seeds are wanted. In the makhorka inflorescence flowers are not set with perfect regularity. In the varieties studied the development of the floral bud required 10–12 days, the blossoming period 1 day, and the period between blossoming and the maturity of the capsule 28 days.

Topping and desuckering.

837. Micenko, E. A.
The influence of topping time on the yield and quality of tobacco. [Russian.]
Sborn. n.-i. rabot, VITIM, 1958, No. 150, pp. 160-77, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,217.

Topping is more effective in the earlier developmental stages, assuming that the maximum number of leaves is left on the plant. Topping when the buds appear and the first flower blooms results in an increase in the size of leaves on the 3rd, 4th and 5th tiers and in "body" of the leaves on the 4th tier and above the 5th tier. In most cases topping during the emergence and maturation of the central capsule had little effect. The effect of topping on the quality and chemical composition of 4 varieties is discussed.

838. McEvoy, E. T., and Hoffman, I.
The use of chemicals to suppress sucker growth on cigar tobacco.
Canad. J. Plant Sci., 1959, **39**: 350-4, bibl. 5.

Studies on the chemical control of sucker growth on cigar tobacco showed that a mineral oil-water emulsion applied to the stub of the broken stem after the plant was decapitated, and also the diethanolamine salt of maleic hydrazide sprayed on the leaves, suppressed sucker growth significantly and increased the yield of the cured crop. Each chemical treatment resulted in a decrease in the percentage content of total alkaloids, nicotine, Ca and total ash in the cured leaf, but had no apparent influence on the content of total N, nornicotine, K, P, Mg or Cl. [From authors' abstract.]—Canada Dep. Agric., Ottawa, Ont.

839. Esso Research and Engineering Co.
Improved desuckering compositions.
British Patent **781,636** of 19.10.55, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-190.

Consists of a petroleum mineral oil of specific gravity 0·750–0·950, boiling point 300–1,000° F. and viscosity of 80–600 SSU at 100° F., and non-phytotoxic amounts (0·001–5·0% by weight) of an antioxidant (e.g. 2:2′-methylene-*bis*-(4-methyl-6-*tert.*-butylphenol)) and optionally 0·1–20% by weight of an emulsifying agent.

840. Coulson, D. A.
Some effects of maleic hydrazide on flue-cured tobacco quality.
Tobacco, N.Y., 1959, **148**(21): 20-3, bibl. 4.

Tests of MH for sucker control, using 2·25 lb./acre of a formulation containing 30% active ingredient, were carried out on several varieties in Georgia and North Carolina. Comparisons of their chemical composition with that of hand-suckered tobacco showed that MH caused reductions in ash alkalinity and in the contents of alkaloids, crude fibre and petroleum ether extractives. Soluble sugars were increased. The MH-treated tobacco was more "leathery" and had a lower filling value—a serious disadvantage in cigarette tobacco. The author points out that these changes, which impair quality, are not invariable and might be eliminated by modifying field practice.—Imp. Tobacco Co. Ltd., Richmond, Va.

841. Moseley, J. M.
Effects of maleic hydrazide when used as a sucker control agent upon the quality of flue-cured tobacco.
Tobacco, N.Y., 1959, **148**(21): 24-5, bibl. 3.

MH-treated tobacco from 66 test crops, when compared with hand-desuckered tobacco, was generally judged of poor quality on inspection and in smoking tests. MH-treatment caused increases in strip yield, moisture-holding capacity, sugar content and alkalinity of water-soluble ash, together with decreases in specific volume and nicotine and ash contents. It was concluded that MH rendered the tobacco less suitable for cigarette manufacture.—American Tobacco Co., Richmond, Va.

842. Gaines, J. G.
Influence of maleic hydrazide in relation to other practices on flue-cured tobacco production.
Tobacco, N.Y., 1959, **148**(22): 20-3.

Owing to shortages of skilled labour many tobacco growers have abandoned topping, since allowing the tops to grow restricts sucker growth, even though lower yields and returns result from this practice. The use of MH is considered against this background, and it is pointed out that MH increases yields and returns without measurably reducing quality and prices. In trials over 3 years MH increased sugar contents and the sugar-nicotine ratio, reduced specific volume and usually reduced nicotine. Failure to top caused a greater reduction in nicotine, slightly reduced sugar contents and significantly increased specific volume. The desirability of reviewing grade standards is considered.—U.S.D.A. and Georgia Coastal Plain Exp. Stat., Tifton.

843. Vickery, L. S.
Some effects of maleic hydrazide on flue-cured tobacco quality.
Tobacco, N.Y., 1959, **148**(22): 24-5, bibl. 2.

Preliminary observations are made on the effects of MH on tobacco quality. Whereas the sodium salt formulation containing 40% MH caused an undesirable taste in smoking, the diethanolamine salt formulation containing 30% MH did not.—Canada Dep. Agric., Delhi, Ontario.

Physiology, biochemistry and crop composition.

(*See also* 73, 520, 826-828, 831, 838, 870, 871, 888, 890, 898, 1425.)

844. Vlitos, A. J., and Crosby, D. G.
Isolation of fatty alcohols with plant-growth promoting activity from Maryland Mammoth tobacco.
Nature, 1959, **184**: 462-3, bibl. 3.

In this variety 3-indoleacetic acid cannot be detected in the leaves and apical tissues, but an isolate from these tissues was prepared, which showed growth-promoting activity and is probably composed of long-chain normal primary alcohols. —Boyce Thompson Inst., Yonkers, N.Y., and Union Carbide Chem. Co., S. Charleston, W. Va.

845. Pyriki, C.
Beziehungen zwischen der chemischen Zusammensetzung des Tabaks und den Merkmalen des Rauches. **(The relationship between the chemical composition of tobacco and the characteristics of its smoke.)** [Russian and English summaries 18 lines each.]
Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 66-105, bibl. 174.

A review.

846. Pyriki, C., and Homann, W. F.
Über Chinatabake. II. Mitteilung. Die weiteren Merkmale der Tabake und die Wechselbeziehungen zwischen der chemischen Zusammensetzung und der Handelsqualität. (**On Chinese tobaccos. 2nd communication. Further characteristics of these tobaccos and the interrelationship between their chemical composition and commercial quality.**) [Russian and English summaries 17 and 18 lines.]
Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 106-25, bibl. 26.

For a note of part I see *H.A.*, 29: 2651r.

847. Ogg, C. L., and four other collaborators.
Report on the determination of total alkaloids, nicotine and nornicotine in tobacco.
Tobacco, N.Y., 1959, **149**(2): 19-24, bibl. 5.

Burley, flue-cured, cigar-filler, Maryland and Turkish samples were analysed for total alkaloids by 3 methods, namely, the Cundiff-Markunas method, the Griffith method and a tentative procedure similar to that of the Association of Official Agricultural Chemists. The collaborator's own method was also tested if it differed from the 3 main methods. Nicotine and nornicotine were determined by the Cundiff-Markunas procedure. The data showed good statistical agreement for the 3 methods for all samples except Maryland which was high in nornicotine. The Cundiff-Markunas procedure tended to give low results for nornicotine.

848. Sinha, A.
Separation and estimation of tobacco alkaloids by paper chromatography.
Curr. Sci., 1959, **28**: 196-7, bibl. 6.

Nicotine, nicotimine, anabasine, anatabine and nornicotine contents of mild and strong tobaccos.

849. Jeffrey, R. N.
Alkaloid composition of species of *Nicotiana*.
Tobacco, N.Y., 1959, **148**(26): 24-8, bibl. 19.

The alkaloids in green and air-cured samples from pruned (topped and desuckered) and unpruned plants of 27 species and varieties of *Nicotiana* were investigated. The proportions of different alkaloids were altered by curing, and nicotine appears to be converted into nornicotine in many species. The total alkaloid content was affected by season and by pruning, as is the case with *N. tabacum*. Evidence is presented that the North American Indians preferred to smoke species containing nicotine rather than those containing nornicotine; the same preference has been found in modern smoking panels.—U.S.D.A., Beltsville, Md.

850. Leete, E., and Bell, V. M.
The biogenesis of the *Nicotiana* alkaloids. VIII. The metabolism of nicotine in *N. tabacum*.
J. Amer. chem. Soc., 1959, **81**: 4358-9, bibl. 11.

In order to investigate the metabolism of nicotine in the intact tobacco plant, methyl-C^{14} nicotine and nicotine-2,5-C^{14} were fed, in separate experiments, to *N. tabacum* plants. Nicotine was isolated from the plants at various times, from 1 to 7 weeks after administration of the tracers. The recovered nicotine was radioactive in each case, and systematic degradation indicated that there had been no randomization of activity. The average recovery of the 2,5-labelled nicotine was about 6%, whereas the recovery of the methyl-labelled nicotine was only about 1%, indicating extensive metabolic breakdown of the radioactive alkaloids. Radioactive choline was isolated from a plant which had been fed methyl-labelled nicotine, and degradation indicated that 90% of the activity was located on the methyl groups of the choline. Nicotine thus acts as a methyl donor in the tobacco plant. [Authors' abstract. For parts VI and VII, see *H.A.*, 29: 606 and 607.]—Univ. Minnesota.

851. Griffith, T., and Byerrum, R. U.
Studies on the biogenesis of the heterocyclic rings of nicotine.
Abstr. in *Fed. Proc.*, 1959, **18 I**(1), No. 942, from *Tob. Abstr.*, 1959, **3**, Abstr. 879.

Radioactive nicotine was synthesized by *N. rustica*, which was fed different samples of sodium acetate and sodium pyruvate labelled in the individual carbons with C^{14}. Acetate-2-C^{14} and pyruvate-3-C^{14} were converted to nicotine with dilutions (specific activity of fed material/specific activity of isolated nicotine) of 323 and 243 respectively, whereas pyruvate-1-C^{14} was incorporated with a dilution of 8370. In addition, acetate-1-C^{14} and pyruvate-2-C^{14} were incorporated into nicotine with dilutions of 950 and 3370 respectively. These results are consistent with the hypothesis that pyruvate for the most part was converted to acetate before being incorporated into nicotine. Nicotine from plants fed acetate-1-C^{14} and acetate-2-C^{14} was partially degraded in each case to discover the location of C^{14} in the molecule. When acetate-1-C^{14} was administered to the plants, the nicotine contained C^{14} only in the pyrrolidine ring and about one-half of the total C^{14} was present in the 2-carbon of the ring. After acetate-2-C^{14} was fed, approximately 40% of the total radioactivity of the nicotine was present in the pyridine ring. Of the remaining 60%, about 10% resided in the 2-carbon and 50% in the three, four and five carbons of the pyrrolidine ring.

852. GIOVANNOZZI-SERMANNI, G.
Richerche analitiche su *Nicotiana tabacum* con cromatografia su carta. VIII. Interdipendenze tra amminoacidi e nicotina. **(Paper-chromatographic analyses of *Nicotiana tabacum*. VIII. Interdependence of amino acids and nicotine.)**
Tabacco, 1959, **63**: 87-93, bibl. 28.

Ornithine, tryptophane and lysine, probable precursors of the heterocyclic rings of nicotine, were the amino acids most affected by the presence or absence of alkaloids. [From author's summary. For part VI, see *H.A.*, 28: 2777.]

853. IL'IN, G. S., AND LOVKOVA, M. JA.
Nicotine and amino acid transformation in ripening tobacco seeds. [Russian, with English summary ¼ p.]
Biohimija, 1959, **24**: 838-41, bibl. 15.

The nicotine in tobacco seeds, appreciable in the early stages of development, had disappeared by the time they were fully ripe. The free amino acid content of the immature seeds was also found to be high, but it gradually declined as the various amino acids accumulated in the protein reserve of the seeds. A relationship between the nicotine and amino acid metabolism of the seed is suggested.

854. MACLACHLAN, G. A., AND PORTER, H. K.
Replacement of oxidation by light as the energy source for glucose metabolism in tobacco leaf.
Proc. roy. Soc., Ser. B, 1959, **150**: 460-73, bibl. 27, illus.

When kept in light under anaerobic conditions tobacco leaf disks infiltrated with 5% glucose solutions synthesized starch and sucrose, thus indicating that phosphorylation was light-induced.

855. PORTER, H. K., MARTIN, R. V., AND BIRD, I. F.
Synthesis and dissolution of starch labelled with ^{14}carbon in tobacco leaf tissue.
J. exp. Bot., 1959, **10**: 264-76, bibl. 10.

Analytical results show that starch is the main respiratory substrate, and, to account for the redistribution of radioactivity in passage to CO_2, it is concluded that sucrose occurs at two sites separated inter- or intra-cellularly, one of which is in equilibrium with the system interconverting starch and CO_2, while at the other hexoses are produced by inversion. A starch-like polysaccharide is formed during assimilation which persists in the dark, and there is a significant contribution to respiration of carbon from non-carbohydrate sources when leaf disks are kept in the dark. [From authors' summary.]—Imp. Coll. Sci. Tech., London.

856. HARRELL, T. G.
Titrimetric determination of chloride in tobacco products.
[*Publ.*] *R. J. Reynolds Tobacco Co.*, pp. 7, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,057.

By potentiometric titration with silver nitrate using a silver and glass electrode system.

857. OGG, C. L., AND OTHERS.
Report on the determination of total nitrogen in tobacco.
Tobacco, N.Y., 1959, **149**(1): 20-3, bibl. 1.

A comparison of various procedures using the Kjeldahl method.

858. GLADDING, R. N., AND WRIGHT, H. E., JR.
Paraffin waxes of burley tobacco and their isolation.
Tobacco, N.Y., 1959, **148**(23): 20-1, bibl. 6.

The total paraffin fraction, m.p.: 64–65° C., was isolated from the leaf web of aged burley tobacco in an amount corresponding to 0·31% of the dry weight of the leaf. Heptacosane ($C_{27}H_{56}$) and hentriacontane ($C_{31}H_{64}$) were identified as the lowest and highest melting paraffins, respectively, of the total paraffin fraction. The presence of an intermediate paraffin was not established. [From authors' summary.]—American Tobacco Co., Richmond, Va.

859. CARRUTHERS, W., AND JOHNSTONE, R. A. W.
Composition of a paraffin wax fraction from tobacco leaf and tobacco smoke.
Nature, 1959, **184**: 1131-2, bibl. 27.

860. OLLERO GÓMEZ, A., AND PANEQUE GUERRERO, A.
Determinación de peroxidasa en tabacos. **(Determination of peroxidase in tobacco.)** [English summary 7 lines.]
Bol. Inst. nac. Invest. agron., Madrid, 1959, **19**: 1-21, bibl. 22.

The methods of Balls and Hale and of Purr were the best tested.

861. MIHAJLOV, M. K.
On Šmuk's method of polyphenol determination in tobacco. [Russian.]
Tabak, 1959, **20**(2): 41-3, bibl. 8, illus.

The limitations of the method are discussed.

862. REID, W. W.
Incorporation of carbon 14 into tobacco leaves with particular reference to polyphenols. Part I.
Tobacco, N.Y., 1959, **149**(4): 20-3, bibl. 9, illus.

Chromatographic method suitable for examining biosynthetic pathways.

863. Sisler, E. C., and Evans, H. J.
Electron transport mechanisms in tobacco roots. II. Reduced pyridine nucleotide oxidative pathways.
Tobacco, N.Y., 1958, **147**(24): 20-6, bibl. 20.

A soluble enzyme has been purified from tobacco roots which will transfer electrons from reduced pyridine nucleotides to 2,6-dichlorophenolindophenol and various quinones. In the presence of menadione and the enzyme, electrons may be transferred from DPNH to cytochrome *c*. It also has been demonstrated that chlorogenic acid will reduce cytochrome *c*, and that the oxidized chlorogenic acid formed may be converted back to the reduced form by reduced pyridine nucleotides. An enzyme is unnecessary for these coupled reactions. It has been demonstrated that electrons may be transferred from reduced pyridine nucleotides to chlorogenic acid and then to oxygen *via* a diaphorase-free polyphenol oxidase preparation. The K_m value of the purified polyphenol oxidase has been determined to be $1{\cdot}5 \times 10^{-5}$M, and the possibility that it may serve as a terminal oxidase has been discussed. [Author's summary. For part I see *H.A.*, 29: 2624.]—N.C. St. Coll., Raleigh.

864. Stedman, R. L.
Some aspects of tobacco chemistry.
CMA Res. Seminar, 1958, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,056.

Among tobacco phytosterols, γ-sitosteryl glucoside from chewing tobacco and stigmasterol from cigarette smoke were the only ones identified until now. The author demonstrated the presence of these compounds in flue-cured tobacco together with ergosterol, β-sitosteryl glucoside and a partially characterized sterol not previously reported in plants. Free stigmasterol was isolated by chromatography of the acetone-soluble portion of a Skellysolve B extract of an unaged Virginia tobacco. β-Sitosteryl glucoside was isolated from an ethanolic extract of tobacco previously extracted with Skellysolve B. Ergosterol and γ-sitosterol were obtained by fractional precipitation of a mixture of tobacco sterols isolated by digitonin precipitation. The partially characterized sterol was isolated from ethanolic tobacco extracts as a glucoside and in the fractionation of the mixed tobacco phytosterols mentioned above. The sterol is not identical with any known phytosterol. It is a 3-β-sterol with $\triangle^5$ unsaturation and a 24-*a*-methyl configuration. The levels of phytosterols in tobacco vary between 0·1 and 0·4%. From the same tobacco was also isolated isoeugenol, a mixture of phthalic acid esters and of an aliphatic hydrocarbon, the chain of which, in the range of C_{40}, is of greater length than any previously reported. Isoeugenol was obtained from an ethanolic extract of tobacco by distillation and purification. The alcoholic components derived from the phthalic acid were *n*-propyl, *n*-butyl and an unidentified alcohol which seems to be of the C_6 type. The identification processes of the different substances were indicated.

865. Hankin, L.
A technique for the extraction of volatile aroma-bearing components from tobacco.
Tobacco, N.Y., 1959, **148**(24): 20-2, bibl. 4.

The method described, which has been applied to both cured and fermented Connecticut 49 shade-grown tobacco, involves consecutive extraction of dry tobacco with cyclohexane and methanol followed by separation of the volatile components into chemical classes.—Conn. agric. Exp. Stat., New Haven.

Diseases and pests.

866. Radovanović, Ž. M.
Važnije bolesti duvana u Srbiji i Makedoniji i iskustva sa njihovim suzbijanjem. (**Some important diseases of tobacco in Serbia and Macedonia and experience in controlling them.**) [English summary ¾ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 189-95, bibl. 4.

The commonest fungal pathogens are: *Pythium debaryanum*, *Olpidium brassicae*, *Fusarium* sp., *Rhizoctonia solani*, *Thielavia basicola* and *Oidium tabaci*. *Bacterium tabacum* is also prevalent, as are the *Nicotiana* viruses types 1, 12 and 14. Diseases of unknown origin are "basara" and green net. The usual moulds are found on dry tobacco in humid and warm conditions in autumn and winter. For general disease control bordeaux is the most widely used fungicide, and seed disinfection is also recommended.—Inst. Tob. Cult., Belgrade.

867. Schmelzer, K., and Klinkowski, M.
Die Reaktion einiger Tabaksorten und Differentialwirte gegenüber den Viren der Tabakätzmosaik-Gruppe. Zugleich ein Beitrag zur Kenntnis der Stamme des Kartoffel-Y-Virus. (**The reaction of some tobacco varieties and differential hosts to viruses of the tobacco etch group; together with new data on strains of the potato-Y virus.**)
Züchter, 1959, **29**: 229-37, bibl. 18, illus.

Injection tests with viruses of the tobacco etch group indicated that the varieties Ergo, 032 and V20 will be of value as parents in breeding for resistance.—Inst. Phytopath., Aschersleben.

868. Tepfer, S. S., and Chessin, M.
Effects of tobacco mosaic virus on early leaf development in tobacco.
Amer. J. Bot., 1959, **46**: 496-509, bibl. 29, illus.

At certain stages of infection tobacco mosaic virus causes the formation of highly abnormal tobacco leaves, classified here as narrow-bladed leaves and "shoestring" leaves. The development and anatomy of these types are described. The "shoestring" leaf in its extreme form is entirely radial in symmetry, with no vestige of a lamina. This suppression of dorsiventrality is expressed to a lesser degree in narrow-bladed leaves and in transitional forms. The lack of or reduction of dorsiventrality results directly from the absence of or reduced activity of the marginal meristems of the leaf primordium. There is a general reduction in meristematic activity in the primordium that causes reduced length as well as reduced laminal development. [Authors' abstract.]—Univ. Oregon, Eugene, and Montana St. Univ., Missoula.

869. Martin, C.
Étude de quelques déviations du métabolisme chez les plantes atteintes de maladies à virus (*suite*). **(Study of some metabolic abnormalities in plants affected by virus diseases. (Cont.).)**
Ann. Physiol. vég., 1959, **1**: 59-82, bibl. 27, illus.

Mosaic-affected leaves of tobacco and dahlia had higher contents of phenols than healthy leaves. In tobacco the differences were positively related to day length, decreasing with plant age and with the onset of flowering. A fluorescent compound isolated from mosaic-diseased tobacco leaves was identified as scopolin. It inhibited growth at concentrations of 10^{-4} and 10^{-7}, and was more toxic than scopoletin (also a growth inhibitor), of which it is the glucoside. [The earlier part of this paper has not yet been traced.]

870. Yamaguchi, A., and Hirai, T.
The effect of local infection with tobacco mosaic virus on respiration in leaves of *Nicotiana glutinosa*.
Phytopathology, 1959, **49**: 447-9, bibl. 10.

The respiration of half-leaves of *Nicotiana glutinosa* inoculated with TMV was higher than that of uninoculated halves after local necrotic lesions appeared. This increased ratio of respiration seemed to vary considerably with the various stages of development of the lesions. Increase of virus was rapid in the inoculated leaves before the appearance of lesions. The respiratory rate did not increase until the lesions appeared. It was tentatively concluded that the increased rate of respiration is not associated with the rapid increase of virus, but rather reflects the formation of local necrotic lesions. [From authors' summary.]—Nagoya Univ., Azyo, Aichi-ken, Japan.

871. Solymosy, F., Farkas, G. L., and Király, Z.
Biochemical mechanism of lesion formation in virus-infected plant tissues.
Nature, 1959, **184**: 706-7, bibl. 12.

The viruses of tobacco mosaic, tobacco necrosis and cucumber mosaic, when spreading systemically in seedlings of tobacco, *Nicotiana glutinosa* and *Datura stramonium*, had no effect on the polyphenoloxidase activity of the leaves, but when they caused local lesions this activity was markedly increased. The stimulation was greatly reduced by supplying detached leaves with 10^{-2} M glutathione or cysteine to raise the leaf content of reducing agents to 7–8 times normal, and was almost totally inhibited by 10^{-2} M ascorbic acid. These substances, however, did not completely prevent the viruses from proliferating. The increase of polyphenoloxidase activity was the cause, and not the result, of cellular breakdown.—Res. Inst. Pl. Prot., Budapest.

872. Procenko, A. E., and Smirnova, V. A.
The effect of potassium deficiency in tobacco on the accumulation of tobacco mosaic virus in the leaves. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1959, No. 4, pp. 590-4, bibl. 9.

The multiplication of tobacco mosaic virus was inhibited when tobacco was grown in K-deficient sand culture. The introduction into the leaves of a K salt solution at 0·01 or 0·025 M increased the virus concentration. Excess of K did not produce an appreciable increase in the virus titre. Mg deficiency had no marked effect on virus concentration.

873. Kurtzman, R. H., Jr.
Part I. Inhibition and stimulation of tobacco mosaic virus by purines. Part II. Healthy host enzymes for screening antiviral agents.
Diss. Abstr., 1959, **20**: 478-9, being *L.C. Card No. Mic.* 59-2771 of 70 pp.

The effect of 14 purines on the multiplication of tobacco mosaic virus and growth of host tissue cultures was studied, and 6-methylpurine was also tested on whole plants. The latter was the only one to inhibit virus multiplication without inhibiting the growth of the host, and its application at 10 mg./l. delayed symptom appearance for 7 days. Two phosphorylase enzymes were used in screening for antiviral activity, but only tentative conclusions have so far been reached.—Univ. Wis.

874. Koelle, G.
Versuche zur Vererbung der Krankheitsresistenz bei Tabak. 4. Mitteilung. Rippenbräunebefall auf verschiedenen Stellen des Feldes im Sommer 1958 unter genetischem Gesichtspunkt. **(Studies on the genetics of disease resistance in tobacco. Part 4. Vein-banding in different parts of the field in the summer of 1958 from a genetical point of view.)**
Tabak-Forsch., Mainz, 1959, **27**: 101-7, bibl. 10, illus., from *Abstract Card Inst. Tabakforsch., Dresden*, No. 59/453.

Both susceptible and resistant plants showed more vein-banding with low N plus high P manuring than with high N plus low P manuring. Plants transplanted early showed vein browning earliest. Resistance and susceptibility are discussed as a metabolic physiological problem.

875. Maine, E. C.
Influence of host components on resistance to *Pseudomonas solanacearum*, causal agent of bacterial wilt.
Thesis, N.C. St. Coll., 1958, pp. 83, illus., from *Tob. Abstr.*, 1959, **3**, Abstr. 751.

Chlorogenic acid may be a factor contributing to resistance against Granville wilt, caused by *P. solanacearum.* More chlorogenic acid was present in resistant than in susceptible tobacco plants, although concentrations of this compound were lower in diseased than in healthy plants. *In vitro* toxicity tests revealed that oxidized chlorogenic acid has bactericidal effects on the wilt bacterium, in contrast to the reduced form, which is only bacteriostatic. Concentrations of scopoletin and at least one unidentified phenolic compound were inversely correlated with resistance. Levels of both these compounds increased following infection, with the greatest increases occurring in the susceptible plants.

876. Mickovski, J.
Primena preparata Karathane u borbi protiv pepelnice na duvanu. **(The application of Karathane for the control of tobacco mildew.)** [English summary ½ p.]
Zasht. Bilja, 1958, No. 47/48, pp. 197-204, bibl. 9.

In a 2-year trial 0·12% Karathane applied 3–4 times at 12–15 day intervals gave 86–90% control of *Erysiphe cichoracearum* on tobacco. In dry weather the concentration could be reduced to 0·06–0·08%. The treatment, especially at 0·12%, improved leaf quality [see also *H.A.*, 28: 3856g].—Tob. Inst., Prilep.

877. Minev, K.
Hemiske i agrotehničke mere borbe protiv pepelnice duvana. **(Cultural and chemical methods for the control of tobacco powdery mildew.)** [English summary 1 p.]
Zasht. Bilja, 1958, No. 47/48, pp. 205-11.

The cultural methods investigated, namely, irrigation, removal of the 3–4 lower leaves and decapitation of the inflorescence proved useless. Of the fungicides tried, Cosan (wettable sulphur) in 0·1–0·2% solution was the most efficacious, followed by 0·3% Shirlan.—Fac. Agric. For., Skoplje.

878. Ivančeva-Gabrovska, T.
Resistance of tobacco to black shank *(Phytophthora parasitica* var. *nicotianae).* [Bulgarian, with English and Russian summaries.]
Nauč. Trud. nauč-izsled. Inst. Sašč. Rast., 1958, **1**: 65-103, bibl., illus., from *Ref. Bjull. bolg. nauč. Lit.* (*Sel'sk lesn. Hoz.*), 1959, **4**, Abstr. 129.

The most suitable method of obtaining material for immunity studies was the infection via the soil of vigorously growing plants before flowering. Among 160 forms of *Nicotiana tabacum* and some other species resistance or low susceptibility to black shank was shown in different years by the varieties Banat, Jalomitza, Zihna kanalion, Molovata, Kuba, Virginia 888, *N. tabacum* var. *vurii* and by varieties of *N. rustica.* It was found that the varieties resistant to black shank in any year were normally late maturing or matured late in that year. The existence of different physiological races of the pathogen in Bulgaria was indicated.

879. Matthews, E. M., Kroontje, W., and Henderson, R. G.
Effect of length of rotation on losses from black shank in flue-cured tobacco varieties.
Agron. J., 1959, **51**: 513-14, bibl. 7.

With an unbroken annual succession of tobacco crops on soil infected with black shank (*Phytophthora parasitica* var. *nicotianae*), losses from the disease increased, even in resistant varieties. With a 2-year rotation the increase of losses was slighter, particularly in the more resistant varieties, and a 3-year rotation kept losses consistently low in all except susceptible varieties. The disease was not eradicated by 4 years' absence of a tobacco crop.

880. Morgan, O. D.
Greenhouse and laboratory studies on chemical soil drenches to control *Phytophthora parasitica* var. *nicotianae,* the cause of black shank of tobacco.
From abstr. in *Phytopathology*, 1959, **49**: 525.

Of the numerous chemicals tested the disulphide and manganese salts of Omadine (2-pyridinethione 1-oxide), at 300 and 600 p.p.m., and N521 (Mylone), at 300 and 400 p.p.m., were the most effective.

881. Ribaldi, M.
Alcune osservazioni sull'avvizzimento del tabacco da fascia causato da *Sclerotinia sclerotiorum* (Lib) de By. in colture sotto garza. **(Some observations on wilt due to *Sclerotinia sclerotiorum* in shade-grown wrapper tobacco.)** [English summary ¼ p.]
Tabacco, 1959, **63**: 13-24, bibl. 29, illus.

A severe attack of stem rot was due to the plants (Scafati 7) being weakened by nutrient unbalance caused by excessive applications of K and Mg to a soil possessing a relatively low Ca supply.

882. Klarner, S.
Odporność odmian tytoniu typu Kentucky na czarną zgorzel korzeniową (*Thielaviopsis basicola* Ferr.). **(Resistance of Kentucky type tobacco varieties to black root rot disease.)** [Russian and English summaries ¾ p. each.]
Roczn. Nauk roln., Ser. A, 1959, **79**: 1063-75, bibl. 8.

Of 18 varieties and strains tested the Kentucky root-rot-resistant lines 118 and 119 were the most resistant to black root rot. Degree of infection was distinctly correlated with height, development, growth rate and flowering period.

883. Bünzli, G. H., and Büttiker, W. W.
A comparative study of the soil conditions favoured by certain melolonthid and tenebrionid pests of tobacco in Southern Rhodesia.
Bull. ent. Res., 1959, **50**: 259-63, bibl. 1.

Anomala exitialis, *Schizonycha profuga*, *Psammodes similis* and *P. scrobicollis*.

884. Guthrie, F. E., and others.
Control of hornworms and budworms on tobacco with reduced insecticide dosage.
Tobacco, N.Y., 1959, **148**(20): 20-3, bibl. 4.
Farrier, M. H., Guthrie, F. E., and Rabb, R. L.
Why—when—how—to control tobacco worms.
Res. and Fmg, N.C., 1959, **17**(4): 8-9, illus.

Preparations of *B. thuringiensis*, TDE, endrin and various insecticides in common use were tested against *Protoparce sexta*, *Heliothis virescens* and other pests. Results indicated that a commercial degree of hornworm control can be effected by using about one-fifth of the recommended insecticidal doses, thus reducing residues considerably. Preparations of *B. thuringiensis* were effective against hornworms but not against budworms, control of the latter needing insecticidal treatment on a 14-day schedule. The second paper discusses losses caused by hornworms and budworms and provides a table showing the times, quantities and methods of applying endrin, DDT and TDE.

885. Heyns, J.
Control tobacco slug by destroying old beds.
Fmg S. Afr., 1959, **35**(5): 45-6, illus.

Control of the tobacco "slug", which is the larval stage of the beetle *Lema bilineata*, can be accomplished by the destruction of old beds and wild host plants, and by dusting the seed-beds each week with a mixture of DDT, sulphur and copper.

886. Müller, B.
Nicotiana tabacum L. als Wirtspflanze für *Lygus pubescens* Reut. (**Tobacco as a host of *Lygus pubescens*.**)
Ber. Inst. Tabakforsch. Dresden, 1959, **6**: 61-5, bibl. 6, illus.

Symptoms shown by tobacco plants and biology of the bug.

887. Bowery, T. G., and others.
Insecticide residues on tobacco.
J. agric. Food Chem., 1959, **7**: 693-702, bibl. 28.

Residues of TDE and endrin on green tobacco at priming were found to be above 50 and 10 p.p.m. respectively. At marketing time these figures fell to 37 and 1·8 p.p.m., but in manufactured cigarettes there was an average of 13γ of TDE and 0·2γ of endrin per cigarette. It is concluded that residues of these insecticides should be minimized by better timing and placement of applications and by reduced dosages.—N.C. St. Coll., Raleigh.

Harvesting, curing and fermentation.

888. Bowman, D. R., Nichols, B. C., and Jeffrey, R. N.
Time of harvest, its effect on the chemical composition of individual leaves of burley tobacco.
Bull. Tenn. agric. Exp. Stat. **291**, 1958, pp. 18, from *Tob. Abstr.*, 1959, **3**, Abstr. 823.

Gains of dry matter in the leaves at the top of the plant were greater than losses at the bottom of the plant. Total N percentage was higher in the less mature leaves regardless of position on the plant or the time of harvest. The top of the plant contained more acid-insoluble N in earlier harvests, but the bottom of the plant contained the most total N in later harvests. The nicotine content of leaves increased with maturity of the plant. The increase after topping was most pronounced at the top but extended down to the middle of the plant. The crude ash content of the leaves decreased from the bottom to the top of the plant. The Cl content of leaves increased from the base to the top of the plant; the P content of the leaves showed a nearly constant level. The K content of the leaves from the first two harvests was higher than that from the last two harvests. In each harvest the non-nicotine soluble N increased from the base to the top of the plant.

889. Ribeiro Filho, J.
Preparo do fumo em corda. Técnica e considerações gerais. (**Preparation of twist tobacco. Technique and general considerations.**)
Rev. Ceres, 1959, **10**: 456-79, bibl. 12, illus.

The series of processes, including air curing and fermentation, used in the Minas Gerais province of Brazil are described. The curing huts are without control of temperature, humidity or ventilation.

890. Gordienko, A. L., and Mišareva, N. T.
On the quality and yield of oriental filler tobacco harvested on the stalk. [Russian.]
Sborn. n.-i. rabot, VITIM, 1958, No. 150, pp. 266-76, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,276.

With Ostrolist 2747 curing on the stalk did not lower commercial and taste qualities. Cured tobacco had a lower total N content, owing to the movement of its mobile forms from the leaf towards the stalk, as well as a lower content of protein N. Carbohydrates were more completely degraded during curing, and dry matter loss was higher. There was no perceptible difference with regard to the thickness and hygrometric characters of the tissue. Stalk harvesting and curing are simpler and more economical, and the loading capacity of the curing barns is increased.

891. Ogden, W. B.
Tobacco curing in Wisconsin.
Circ. Univ. Wis. Ext. Serv. **481**, revised 1958, pp. 8.

The importance of ensuring maturity of the leaf in the field is stressed, and guidance given on this point. The optimum temperature in the curing sheds is 80–90° C., and the R.H. should be 10 to 15 points below the temperature figure. Methods of attaining these figures with gas and charcoal heaters are outlined.

892. Scott, W. A.
Investigations on curing burley tobacco with artificial aids.
Canad. J. Plant Sci., 1959, **39**: 284-92, bibl. 3, illus.

Two methods of providing supplementary aid to natural curing of cigarette burley tobaccos were investigated through 5 consecutive curing seasons. In one method temperature and humidity controlled heaters were used, and in the other a specially constructed calcium chloride dehydrator. Both methods were compared concurrently with natural air curing in respective pilot barns of three-quarter acre capacity. A similar comparison of curing was made in heated and unheated 3-acre capacity barns through 2 curing seasons. Supplementary heating produced the best results (improved quality, increased yields) but was ineffective during exceptionally cool weather. [Author's abstract.]—Canada Dep. Agric., Harrow, Ont.

893. Nalivko, G. V.
Physical properties of high temperature cured tobacco. [Russian.]
Sborn. n.-i. rabot, VITIM, 1958, No. 150, pp. 246-51, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,282.

In high temperature curing (80–140° C. for the parenchyma and 80–120° C. for the midribs), temperature and air humidity had no perceptible influence on the physical properties of raw tobacco. The elasticity of tobacco increases with its humidity in the range of 9 to 25%. " Resistance " also increases but only up to a humidity of 11 to 12%, and decreases above this limit. The superficial shrinking and the dry matter loss of the leaves are less by this method than by conventional curing.

894. Šapovalov, E. N., and Strižikoza, S. I.
A trial in the Krasnodar region of S.M. Čepurnog's trolleys for the transport of tobacco on drying frames. [Russian.]
Tabak, 1959, **20**(3): 46-8, illus.

These trolleys, running on rails, were found capable of transporting 10 to 14 loaded drying frames, depending on the size of the leaf, between the curing barn and store. As the frames remained on the trolleys during curing, the time required for filling and emptying the curing barn was reduced from 4–5 hours to 10–15 minutes.

895. Kogan, I. S., and Krečkovskaja, F. F.
Mechanization of loading and unloading the fermentation chambers. [Russian.]
Tabak, 1959, **20**(3): 48-50, illus.

To expedite the movement of tobacco in and out of the chambers fork lift trucks are used to move 4-tiered racks. The racks, carrying one bale per tier, are illustrated.

896. Petrenko, A. G., and Šapovalov, E. N.
Continuous fermentation of tobacco in loose layers at high temperatures. [Russian.]
Tabak, 1959, **20**(3): 51-5, bibl. 7.

The process outlined involves the use of 3 chambers through which passes a conveyor belt carrying the leaf in a loose layer 30–50 cm. deep. The leaf is in the pre-heating chamber for 10–20 min., is then fermented for 1–3 hrs at a temperature of 70–90° C. and humidity of 60–90%, and finally cooled off and conditioned. Good quality and economy are claimed.

897. Kogan, I. S.
A complex scheme for the automatic control of a predetermined fermentation regime. [Russian.]
Kelleev, A. M.
Apropos I. S. Kogan's article "A complex scheme . . .". [Russian.]
Tabak, 1959, **20**(2): 35-8, illus., and 39-40.

The use of an automatic regulator for controlling humidity in the fermentation chamber is recommended in the first paper and criticized in the second.

898. Petrenko, A. G., and others.
Polyphenol-oxidase activity as a sign of a complete fermentation of makhorka "Pomorskaja" and of cigar tobacco. [Russian.]
Sborn. n.-i. rabot, VITIM, 1958, No. 150, pp. 277-88, from *CORESTA Inf. Bull.*, 1959, No. 1, Abstr. 2,292.

The polyphenol-oxidase activity of these 2 types is very high, e.g. 2–3 ml. of O_2 per g. of dry matter, and this decreases during fermentation and becomes equal to, or less than, 0·1. In both types the end of the fermentation process can be determined by measuring the activity index of the polyphenoloxidase, and this prevents the loss of time and deterioration that might result from a protracted fermentation.

899. ASMAEV, P. G., AND MOHNAČEV, I. G.
Changes in the composition and quality of tobacco processed at different temperatures. [Russian.]
Tabak, 1959, **20**(3): 55-9, bibl. 12.

The carbohydrate, protein-N and amino-N contents of tobacco leaves fermented at 35°, 50° and 70° C. were determined at 3 equivalent stages of the process. The results are discussed and caution in the use of high fermentation temperatures is advised.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 1427.)

900. LINDENBEIN, W.
Beiträge zur Kenntnis der Samen und Früchte. IV. *Cichorium intybus* L., *C. endivia* L. und *C. calvum* Schultz Bip. ex Ausch. **(Contributions to our knowledge of seeds and fruits. IV. *Cichorium intybus, C. endivia* and *C. calvum.*)**
Saatgut-Wirtsch., 1959, **11**: 173-5, bibl. 15, illus.

Seed characters are described and discussed.

901. KOPERSKI, J.
Wpływ pory sprzętu na ilość i jakość plonu cykorii korzeniowej (*Cichorium intybus* L.). **(Effect of harvesting date on quality and quantity of chicory roots.)** [Russian and English summaries 1¼ pp. each.]
Roczn. Nauk roln., Ser. A, 1958, **78**: 645-66, bibl. 13.

Advancing the harvesting date of three varieties from 10 September to 30 October increased root yields stepwise by a total 28%, reduced leaf yields stepwise by 44%, increased the inulin content up to 10 October, but had no effect on root shape. Varietal differences in yield, susceptibility to bolting, root shape and dry-matter content are discussed.

902. SILLS, V. E.
Rural industries. 1. Ginger products.
Agric. J. Dep. Agric. Fiji, 1959, **29**: 13-16, bibl. 6.

The present position of ginger production in other countries is reviewed. It is considered unlikely that Fiji could re-enter the dried ginger market, but there are possibilities of restarting the export of green ginger to New Zealand.

Drug plants.

(*See also* 871, 956, 958, 961.)

903. HOCKING, G. M.
Pakistan medicinal plants.
Qual. Plant. Maveg., 1958, **5**: 145-53; 1959, **6**: 121-36, illus.

An annotated catalogue on a regional basis.

904. AKAČIĆ, B., AND KUŠTRAK, D.
Versuchskulturen von *Ammi visnaga* (L.) Lam. und *Ammi maius* L. **(Cultural experiments with *Ammi visnaga* and *A. majus.*)**
Acta Pharm. Jug., 1958, **8**: 101-12, from *Bull. sci. Cons. Acad. R.P.F. Belgrade*, 1959, **5**(1): 29.

The two species develop and fruit normally in the vicinity of Zagreb. It was found that early autumn sowing or the transplanting in spring of self-sown autumn seedlings shortened their vegetative development, which was especially important for *A. visnaga*. Both species require a loose sandy soil which should be treated either with a Ca-N fertilizer before sowing of with F.Y.M. every 3–4 years. The fruit of *A. visnaga* contained 0·4% khellin in 1956 and 0·2% in 1957; climatic conditions are suggested as the cause of this difference. The fruit of *A. majus* contained 1·5% furocoumarin derivatives in 1956 and 2·0% in 1957.

905. AKAČIĆ, B., AND KUŠTRAK, D.
Herba Ammeos visnaga und Herba Ammeos maioris. Papierchromatographische Untersuchungen. **(Paper chromatographic studies on plants of *Ammi visnaga* and *A. majus.*)**
Acta Pharm. Jug., 1958, **8**: 205-11, from *Bull. sci. Cons. Acad. R.P.F., Belgrade*, 1959, **5**(1): 29-30.

Active principle contents compared at 6 different stages of plant development.

906. DEGTJAREVA, A. P.
Antibiotic properties of the common myrtle *(Myrtus communis)*. [Russian, with English summary.]
Bjull. naučno-teh. Inform. Gos. Nikitsk. botan. Sad, 1957, No. 3-4, pp. 64-8, from *Ref. Ž.* (*Biol.*), 1958, No. 13, Abstr. 58,792.

A thermo-labile active principle, occurring mainly in the leaves, was found to be highly toxic to *Staphylococcus aureus* and to the microbacterium V, and resembled streptomycin in its action on the tuberculosis bacillus.

907. HLAVÁČKOVÁ, Z.
Křížení máku, zaměřené ke zvýšení obsahu morfinu v suchých makovicích. **(Crossing poppies to obtain higher morphine contents in dry poppy heads.)** [English and Russian summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1959, **32**: 521-36, bibl. 25, illus.

Although in poppy seeds the morphine content is mainly determined by variety and the yield by environment, yet the amount of morphine present is largely dependent on the temperature and rainfall during ripening, and therefore a variety will only give optimum returns when grown under the conditions in which it was developed. In tests on hybrids the F_1 generation showed heterosis in respect of seed weight and plant height, but the morphine contents were intermediate between those of the parents. Relationships in the F_2 generation were complex.

908. ROEMISCH, H.
Morphin aus Gruenmohn: Beitrag zur Möglichkeit seiner Gewinnung. (**Morphine from the green poppy plant. Contribution to the possibility of its production.**)
Pharmazie, 1958, **13**: 769-77, from *Biol. Abstr., Sect. D.*, 1959, **33**, Abstr. 38,842.

From the young plant stage until petal drop from the main stem, the morphine content increased from 0·07 to 0·21% (based on dry weight), remained at the latter figure for 1–2 weeks, and then rapidly fell to 0·14% and to 0·10% at the capsule-ripening time. The morphine content of each third of the plant from 10 cm. above ground level was determined: that of the upper third rapidly increased during flowering from 0·15 to 0·30% morphine; the middle third was quite constant at 0·15%; and the lower third fell from 0·15% to 0·04% at the end of the vegetative period. Thus, in cutting the plant at 30 cm. above the ground (upper ⅔ of plant), some 15% of the morphine content was sacrificed, but production costs were reduced by 30%. When stored in piles, the poppy plants retained their morphine content for about 2 days. Since the harvest period is so brief, the plant must be preserved by drying or ensiling. When dried under infra-red rays, the morphine was completely retained, and when dried in a hot-air drier at 80–100°C., nearly completely retained. When dried by hanging on cords at room temperature, the loss was about 20%, and when dried like hay in the field, the loss was 30% or more. Ensiling over a 5-month period was satisfactory. Press juice or press pulp from green poppies, which underwent a natural fermentation, showed in 8 days' time an increase of up to 50% in morphine content. Using semi-technical procedures of extraction with butanol, yields of 42–44% of the total morphine present were obtained. It is calculated that the green poppy (poppy straw) is 1·5 to 3·5 times as expensive as poppy capsules, hence the latter is still a better source of morphine.—VEB Arzneimittelwerk, Dresden.

909. VARADARAJAN, P. D.
A new species of *Oidium* on *Rauwolfia serpentina*.
Curr. Sci., 1959, **28**: 205-6.

Dusting with sulphur, once a week for 6 weeks, controlled *Oidium rauwolfiae* (sp. nov.) attacking *Rauwolfia serpentina* growing under glass at the Morris Arboretum, Philadelphia, and a general dusting of sulphur in the greenhouse prevented further spread.

910. WORKMAN, R. L., JR.
Comprehensive studies on Utah grown medicinal rhubarb.
Diss. Abstr., 1959, **20**: 1001, being *L.C. Card No. Mic.* 59-3299 of 55 pp.

Extracts of roots and rhizomes of medicinal rhubarb grown in Utah compared satisfactorily with those from the official Chinese source.—Univ. Utah.

Essential oils.

(*See also* 1053, 1057, 1063.)

911. BITTERIA, GY.
Az illóolajnövények termesztése és feldolgozása Magyarországon. (**Production and handling of essential oil plants in Hungary.**)
Olaj, Szappan, Kozmetika, 1958, No. 2, pp. 20-32, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 17.

Including oil extraction figures for peppermint, coriander, dill, lavender and some minor aromatic herbs.

912. BURGER, A.
Palmarosa oil from Angola.
Perfum. essent. Oil Rec., 1958, **49**: 798-800, illus.

The planting and harvesting of *Cymbopogon martini* are briefly described. One planting lasts for 2–3 years, and 1 ha. yields 30–60 kg. of oil per annum. The constants for the oil are given.

913. LOTFY, M., AREF, H., AND HUSSEIN, A. A.
A study on the essential oil in the jasmine flowers, *Jasminum grandiflorum*.
Perfum. essent. Oil Rec., 1958, **49**: 297-302, bibl. 14, illus.

Although most of this paper deals with the chemistry of extraction, some details are given of jasmine culture in Egypt where, unlike Tunisia and France, only 1,300 plants per acre are grown. The yield of flowers in this study varied from 2,445 to 3,467 kg. per acre over 4 years. The flowering season lasted 2½ months. In an experiment using flowers gathered at 4 stages of opening the highest yield and best odour of concrete and absolute were obtained by harvesting in the half blooming stage. The results indicated that the essential oils are formed in the flowers during the blooming stage, whereas the waxes are formed before blooming.—Cairo Univ., Giza.

914. GLUŠČENKO, N. N.
Essential oil crops of China. [Russian.]
Bjull. nauč.-tehn. Inform. Vses. n.-i. In-t maslič. i efiromaslič. Kul'tur, 1957, No. 3, pp. 48-9, from *Ref. Ž. (Biol.)*, 1958, No. 12, Abstr. 53,881.

The distribution of a very wide range of essential oil crops in 3 climatic zones is discussed. An account is given of the cultivation of *Mentha arvensis*, a promising crop for the U.S.S.R. This yields an essential oil containing 70–80%, and in the case of selected plants 90%, of menthol.

915. ANON.
Peppermint.
Perfum. essent. Oil Rec., 1959, **50**: 24-5, illus.

Short popular account of *M. piperita* culture and processing in the U.S.A.

916. MORS, W. B., MAGALHAES, M. T., AND GOTTLIEB, O. R.
Physiological varieties of *Ocotea pretioso*.
Perfum. essent. Oil Rec., 1959, **50**: 26-7, bibl. 9.

One variety, containing safrole as the main constituent of its essential oil, is the Brazilian sassafras of commerce. The other contains methyleugenol as its major oil component.

917. ILIEVA, S., ZOLOTOVITCH, G., AND DIMITROVA, E.
An investigation of the production of essential oil of clary sage—*Salvia sclarea* L. in Bulgaria.
Perfum. essent. Oil Rec., 1957, **48**: 9-15, bibl. 12, illus.

Clary sage is a perennial cultivated as a 2- or 3-year plant. Usually in the first year rosettes of leaves only appear, with most growth and the highest yield of flowers occurring in the second year. The essential oil is used as a perfume and for flavouring. The yield in the second year is 1,000–1,500 kg. of flowering tops per decare [= $\frac{1}{10}$ ha.]; in the third year under favourable conditions 600–800 kg. are obtained. The oil content varies from 0·1 to 0·3%. Dense planting results in a higher yield of tops and oil but poorer quality. Data are given for oils from various countries and from different parts of the plant. The largest yield and best quality of oil is obtained from flowering tops only. The content of essential oil reaches a maximum as the seeds begin to ripen and then declines. The yield of essential oil is also highest during the night and lowest about noon. Immediate distillation after harvest is essential, and material should not be left after cutting for more than 2 hours and it should be kept in the shade. Details of the distillation process and of the yield and quality of the concrete and absolute are given.

918. LUK'JANOV, I. A.
The dormancy of the mucilaginous seeds of *Salvia sclarea*. [Russian.]
Agrobiologija, 1959, No. 2, pp. 294-6.

Laboratory experiments were conducted to elucidate the cause of poor germination in *Salvia sclarea* seed sown in the spring. The results uggest that calcium cations in the soil retard water penetration through the pericarp into the seed, thereby extending dormancy. When the seed was mixed with damp sand, the sand particles adhering to the seed adsorbed some of the cations; in consequence the seeds received a lower concentration and conditions for swelling and germination were improved. $MgSO_4$ at 0·5% added to the seed/sand mixture aided this process and promoted field emergence.

Fibres.

(*See also* 1047, 1229, 1316.)

919. BÓCSA, I.
Kísérletek a magyar egylaki kender előállítására. (**Experiments to produce Hungarian monoecious hemp.**)
Magy. tud. Akad. Agrártud. Oszt. Közl., 1958, No. 1/3, pp. 65-84, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 16.

A breeding programme started in 1951.

920. ARINŠTEJN, A. I., AND PELIPENKO, A. I.
The effect of crossing on the sex of hemp. [Russian.]
Agrobiologija, 1959, No. 2, pp. 298-301.

Some results of 2 years' work with monoecious and dioecious hemp.

921. ŁĄCZYŃSKA-HULEWICZOWA, T.
Wstępne obserwacje nad wpływem czynników zewnętrznych na płeć u konopi. (**Preliminary observations on the effects of external factors on the sex of hemp.**) [German summary.]
Acta Soc. bot. Polon., 1957, **26**: 515-49, bibl. 18, from *Ref. Ž.* (*Biol.*), 1958, No. 12, Abstr. 53,330.

Diploid and tetraploid hemp, *Cannabis sativa*, was sown in pots and in the field on various dates and given various photoperiodic treatments. Day length had a definite effect on sex expression in tetraploid hemp, especially in monoecious plants. Short days (10 hrs) induced the development of female sex characters and increased the size of somatic cells, and, though not altering the size of the pollen grains, retarded the development of the stamens and pollen. On changing over to long days normal viable pollen was formed. When the change-over from short to long days was abrupt, the plants, especially the tetraploids, became deformed and the formation of floral organs was often disrupted.

922. HANIN, M. D.
The application of superphosphate in the row with hemp seeds. [Russian.]
Agrobiologija, 1959, No. 1, pp. 58-63.

On land treated with NK, superphosphate applied with the seeds in the rows was about as effective as a 3-fold rate broadcast. The highest fibre and seed yields were obtained from 15 kg. P_2O_5 per ha. applied in the rows.

923. KALINKEVIČ, A. F., AND UDOVENKO, G. V.
The question of the effect of nutrient conditions on the amino acid content of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **126**: 684-7, bibl. 8.

The effects of $Ca(NO_3)_2$, NH_4OH, $NH_4OH + KCl$, NH_4Cl and $(NH_4)_2SO_4$ on the content of 17 amino acids in the stems of pot grown hemp plants are among the data recorded in this paper.

924. GOIDÀNICH, G., AND FERRI, F.
La batteriosi della canapa da *Pseudomonas cannabina* Šutić et Dowson var. *italica* Dowson. **(A bacteriosis of hemp caused by *Pseudomonas cannabina.*)** [English and German summaries 1¼ pp. each.]
Phytopath. Z., 1959, **37**: 21-32, bibl. 4, illus.

A strain of *Pseudomonas cannabina* has been established as the pathogen causing bacteriosis in Italy. The symptoms of the disease are described. Experiments on control, possibly by antibiotics, are in progress.—Ist. Pat. veg. Bologna.

925. MANNINGER, I., BÓCSA, I., AND KLEMENT, Z.
Kontakt inszekticidek fitotoxikus hatása lenen és kenderen. **(The phytotoxic effects of contact insecticides on flax and hemp plants.)** [Russian and English summaries 1 and 1½ pp.]
Növénytermelés, 1959, **8**: 259-72, bibl. 14, illus.

Bacterial and mycological tests being negative, the tumescences observed on the main roots of hemp at Kompolt in 1954 were ascribed to the phytotoxic action of BHC dustings. In trials in 1955 and 1956 BHC preparations either proved lethal or produced similar symptoms, whereas DDT formulations were innocuous. These findings were confirmed in 1957. A high soil moisture content enhanced phytotoxicity. On sandy soils even low rates of BHC were apt to cause injury.

926. OJEDA L., J., AND MAYAGOITIA D., H.
Estudio químico de algunos suelos henequeneros de Yucatán. **(A chemical study of the soils of Yucatan where henequen is grown.)**
Ciencia, 1957, **17**(7/9): 144-9, illus., from *Biol. Abstr., Sect. D.*, 1959, **33**, Abstr. 38,727.

Thirteen areas were studied in Yucatan where henequen (*Agave fourcroydes*) is grown. Henequen grows well in soils with a pH between 7·2 and 7·9, where the $CaCO_3$ content is very high, where organic matter ranges between 1·97 and 18·38, and where K, B, Mn and Fe are available. The best production is obtained in soils rich in easily assimilable nutrients, especially K. A condition called lateral spotting, affecting the lower leaves, results when K is deficient; failure of development follows where pH levels are unsuitable or $CaCO_3$ is inadequate.—Esc. nac. Cien. biol., Mexico.

927. JEFFREYS, M. D. W.
Length of viability of luffa seeds.
S. Afr. J. Sci., 1959, **55**: 193.

Nine out of 27 seeds germinated after 15 years' storage.

928. ASSAVESNA, S.
Morphology and anatomy of *Phormium tenax* Forster.
Diss. Abstr., 1959, **20**: 858-9, being *L.C. Card No. Mic.* 59-3399 of 83 pp.

A study of the origin, development and structure of the vegetative parts of the plant, and the development of the megagametophyte.—Ore. St. Coll.

929. HAARER, A. E.
Sisal.
World Crops, 1959, **11**: 281-4, illus.

A popular account of growing the crop.

930. GENKEL', P. A., AND OTHERS.
The effect of low positive temperatures on *Agave sisalana.* [Russian, with English summary ½ p.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1959, No. 3, pp. 379-90, bibl. 13.

The external effects of a rapid fall in air temperature, from 20–30° to 1–3° C., on sisal are the appearance of chlorotic stripes and withering followed by necrosis of the leaves. The physiological disturbances involved were found to include an immediate fall followed by a considerable rise in the viscosity of the protoplasm, a reduction in the intensity of the oxidase reactions, and a near cessation of reductase activity. The chloroplasts fragmented and finally disintegrated into a diffused granular mass; this was accompanied by a decline in the chlorophyll content.

Gums and resins.

931. SPOON, W.
Kopal van Nieuw-Guinea. **(Copal from Dutch New Guinea.)** [English summary 1 p.]
Reprinted from *Verfkroniek*, 1959, **32**: 134, as *Ber. Afd. trop. Prod. kon. Inst. Tropen* **267**, 1959, pp. 16, bibl. 9, illus.

Manila copal is collected in south-east Asia from *Agathis* species. Laboratory studies in New Zealand have shown that the melting point of copal is correlated with its age. Analysis of 16 samples of copal from Dutch New Guinea showed that 2 types of copal occur there, a hard type with a melting point about 100° C., and a soft type melting at 70–80° C. The soft type contains some syrup copal which contains a fairly large quantity of essential oil (principally limonene).

932. Guess, W. L.
A pharmaceutical study of a gum from rain lily *(Cooperia pedunculata)*.
Diss. Abstr., 1959, **20**: 275, being *L.C. Card No. Mic.* 59-2203 of 118 pp.

Gum from the bulbs was found to be potentially useful as a pharmaceutical emulsifier and jelly.

933. Scaramuzzi, F.
Il ciclo riproduttivo di *Pistacia lentiscus* L. **(The reproductive cycle of *Pistacia lentiscus.*)** [English summary ¾ p.]
Nuovo G. bot. ital., 1957, **64**: 198-213, bibl. 16, illus., [received 1959].

n this typical Mediterranean species, which is dioecious, flowers are initiated in October. The male flowers are of hermaphrodite origin and develop more rapidly than the female flowers. After pollination and fertilization in May–June a resting period follows, and the fruits begin to form in late August.

Hops.

934. Davis, E. L.
Production of seedless hops by interspecific pollination.
Nature, 1959, **184**: 1336, bibl. 5, illus.

Hops of the variety Late Clusters were pollinated with pollen from the wild hop, *H. japonicus.* Although not to the extent produced by pollen from male Late Clusters, stimulation of bracts, bracteoles and internodal length was very noticeable. The critical "burr" stage, when the cone is particularly susceptible to disease, was greatly reduced by interspecific pollination, as with normal pollination. Fertilization did not occur and no embryo, endosperm or seed developed.—Univ. Mass., Amherst.

935. Richardson, B. D.
Hop propagation.
Tasm. J. Agric., 1959, **30**: 98-105, bibl. 12, illus.

Details are given of propagation from hardwood uttings and layers, with particular reference to work in progress at the Huon Horticultural Research Station. Some comments on the nursery tock available and on cultural, fertilizer and irrigaion practices and freedom from diseases are added.

936. Tasmania Department of Agriculture, Plant Pathology Division.
Grow healthy hops.
Tasm. J. Agric., 1959, **30**: 115.

Disease-free cuttings available of 3 varieties.

937. Kač, M.
Crveni pauk u hmeljanicima savinjske doline i borba protiv njega. (**The red spider mite in the hop gardens of the Savinja valley and its control.**) [German summary 1 p.]
Zasht. Bilja, 1958, No. 49/50, pp. 143-9, bibl. 8.

Tetranychus althaeae is common throughout the hop growing areas of Slovenia. Systemic acaricides (Terra-Sytam or Metasystox), used in conjunction with the ovicide tedion and in some cases with diazinon, are recommended for its control. To avoid a build-up in mite population Metasystox should also be used for the control of aphids (*Phorodon humuli*). Large amounts of spray (2,000–3,000 l./ha.) are advocated for mite control, with two applications being made to the outer rows of fields. The size of mite populations and the extent of the injury they cause are discussed in relation to environmental conditions.

938. Anon.
Getting rid of those hop bines.
Comm. Gr, 1959, No. 3327, p. 531.

By fitting a chute to a forage harvester hop bines and string are fed from the picking machine into the harvester, where they are chopped up and then delivered to trailers or directly on to the soil where they can be used as a mulch for fruit trees.

939. Mekis, M., and Rázga, Z.
Komlókísérletek. (**Hop trials.**)
Erjedésip. Int. Közl., 1958, pp. 44-7, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 120.

No appreciable variations in the bitter principle content of Hungarian hops were found during the period of technical maturity (3–4 weeks). Most of the deficiencies in the finished product could be ascribed to faults of procedure and conditions during drying. A simple method for estimating the amounts of bitter principles in hopped beers has been devised, based on extraction with iso-octane, and by this method it was shown that an increase in the hopping rate decreased the percentage of bitter principles extracted therefrom by the wort.

940. Anon.
New hop drying technique cuts out night work.
Grower, 1959, **52**: 255.

A continuous dryer has been developed to work with a picking machine. The hops are dried on a series of trays mounted on a vertical conveyor which travels down the drying column and up the cooling column. Optimum drying can be obtained by adjusting the speed of travel of the conveyor.

941. Howard, G. A., and Stevens, R.
The occurrence of 2-methylbutyl esters in hop oil.
Chem. Ind. Lond., 1959, No. 48, pp. 1518-19, bibl. 16.

Insecticidal plants.

(*See also* 1465.)

942. ANON.
La roténone, insecticide végétal, est extraite d'une plante brésilienne nommée timbó. **(Rotenone, a vegetable insecticide, is extracted from a Brazilian plant called timbo.)**
Rev. int. Prod. trop., 1959, **34**: 129-30, from *Trop. Abstr.*, 1959, **14**, Abstr. g2770.

Lonchocarpus nicou, a native of the Amazon forest, is cultivated because of the high rotenone content of its roots, viz. 15 to 17% of dry weight. Annual production amounts, at present, to 3,000 tons, of which 80% is sold to the U.S.A.

943. RICHMOND, D. V.
Spray application problems: XLIX. The determination of rotenone in lonchocarpus.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 99-101, bibl. 9.

A comparison of methods for the determination of rotenone in lonchocarpus root and resin showed that the values obtained by a standard method of direct crystallization of solvate were appreciably lower than the true contents and pointed to the desirability of adopting a described alternative method of analysis. [Author's summary.]

944. MARFEY, S. P.
Part I: Studies on the insecticidal principle of *Mammea americana* L. Part II: Cactus alkaloid studies.
Diss. Abstr., 1959, **20**: 91-2, being *L.C. Card No. Mic.* 59-1364 of 147 pp.

I. Chemical determination of the insecticidal principle in the seeds. II. *Lophocereus* spp. contained pilocereine.

945. SCHINDLER, A. J.
Pyrethrum in the highlands of New Guinea.
Papua New Guinea agric. J., 1959, **12**: 1-8, illus.

Pyrethrum growing, mainly based on Kenya practice, is described. It is considered a suitable subsidiary crop for native production in areas over 5,000 ft. in Papua and New Guinea. Extraction and marketing, however, present difficulties.

Rubber plants.

946. HAMMOND, B. L.
Effect of gibberellin, sodium hypochlorite, light, and planting depth on germination of guayule seed.
Agron. J., 1959, **51**: 621-3, bibl. 6.

Both embryo and inner seed-coat dormancy of freshly-harvested guayule achenes were completely broken by continuous exposure to daylight during a germination period of 3 weeks. Gibberellin could replace light in breaking dormancy. Shallow sowing increased the germination of untreated and hypochlorite-treated seeds, mainly as a result of light transmission through the sand. Gibberellin increased emergence of non-dormant seed under a soil cover.—U.S.D.A., Salinas, Calif.

Seed oils.

947. GUNSTONE, F. D., AND MORRIS, L. J.
Fatty acids. Part VI. The oxygenated acid present in *Camelina sativa* (Crantz.) seed oil.
J. chem. Soc. Lond., 1959, pp. 2127-32, bibl. 21.

Shown to be 15 : 16-epoxylinoleic acid.

948. JARRY, A.
Le ricin au Dahomey. **(Castor beans in Dahomey.)**
Oléagineux, 1959, **14**: 641-5, illus.

New varieties and their characteristics are noted. A machine for hulling the seeds is described.

949. CANECCHIO, V. (FILHO), AND DE TELLA, R.
Melhoramento da mamoneira. (*Ricinus communis*, L.) V. Quarta série de ensaios de variedades anãs, 1953-1954. **(Castor selection. V. Fourth series of dwarf variety trials, 1953-54.)** [English summary 7 lines.]
Bragantia, 1958, **17**: 101-7, bibl. 4.

When 6 varieties were compared in 4 localities the widely planted 1A-38 gave the best results, followed by the early, indehiscent varieties 370 and 371. Varieties 1A-38 and 370 had the highest oil contents. Sandy soils gave the best yields.

950. CANECCHIO, V. (FILHO).
Melhoramento da mamoneira (*Ricinus communis* L.). VIII. Oitava e none séries de ensaios de linhagens. **(Castor selection. VIII. Eighth and ninth series of strain trials.)** [English summary 9 lines.]
Bragantia, 1958, **17**: 331-43, bibl. 5.

Strains of 1A-38 and Backer-374 tested.

951. CANECCHIO, V. (FILHO), AND FREIRE, E. S.
Adubação da mamoneira. I. Experiências preliminares. **(Castor fertilization. I. Preliminary trials.** [English summary ⅓ p.]
Bragantia, 1958, **17**: 243-59, bibl. 15.

In 6 trials on the variety 1A-38 on 4 soil types in São Paulo State between 1941/1942 and 1950/51, N at 20–30 kg. per ha. gave satisfactory responses in 3 trials but a significant response in only one, P at 35–50 kg. P_2O_5 per ha. gave satisfactory responses in 3 trials but these did not reach significance, and K at 25–30 kg. K_2O per ha. gave negative or negligible responses in all 6 trials.

952. TAMIR, H., AND GINSBURG, D.
The biosynthesis of ricinine.
J. chem. Soc. Lond., 1959, pp. 2921-6, bibl. 15.

Labelled carbon in 2 forms was fed hydroponically to castor seedlings. In one case it was incorporated in the ricinine in one position, α to the ring-nitrogen atom, and in the second case in both positions equally.—Israel Inst. Technol., Haifa.

953. McKinlay, K. S.
Toxicities of various acaricides to mites of the *Tetranychus* complex in East Africa.
E. Afr. agric. J., 1959, **25**: 28-30.

Metasystox or Rogor at 0·0125% as wetting sprays on both leaf surfaces gave good field control of *T. telarius* on castor beans and cotton. In laboratory tests Aramite and Chlorbenzilate were also effective.

954. Ventura, M. M., and Hollanda Lima, I.
The non-protein nitrogenous constituents in oily seeds. 1. Free amino acids in mature seeds of the favela tree. [In English.]
An. Acad. brasil. Cienc., 1959, **31**: 191-5, bibl. 5.

A qualitative study of the seeds of *Cnidoscolus phyllacanthus*, a possible new source of edible oil.

955. Pouliquen, F.
Contribution à l'étude de l'huile d'ongokéa **(Contribution to the study of ongokea oil.)**
Oléagineux, 1959, **14**: 381-5, 453-9, 541-7, bibl. 81.

This is a chemical study of the seed oil of *Ongokea kleineana*, a large forest tree found in equatorial Africa. The oil is chiefly used as an additive to linseed oil in paint and varnish manufacture and in foundries and metallurgical work. The first part of the paper contains a short description of the tree and its fruit.

956. Gunstone, F. D., and Morris, L. J.
Vegetable oils. VII.—*Strophanthus* seed oils.
J. Sci. Food Agric., 1959, **10**: 522-6, bibl. 12.

A further range of *Strophanthus* oils has been examined. All contain 9-hydroxyoctadec-12-enoic acid (6–15%) and may also contain minor amounts (≯0·1%) of *erythro*-9:10-dihydroxystearic acid. [From authors' summary. For earlier work see *H.A.*, 23: 3259 and 25: 4161.]—St. Andrew's Univ.

957. Chisholm, M. J., and Hopkins, C. Y.
The oxygenated fatty acid of *Tragopogon porrifolius* seed oil.
Chem. Ind. Lond., 1959, No. 37, pp. 1154-5, bibl. 4.

3% of total fatty acids shown to be *cis*-9:10-epoxystearic acid.

Tannin plants.

958. Istas, J. R., and Raekelboom, E. L.
Analyse chimique des écorces d'essences feuillues congolaises. **(Chemical analysis of the bark of broad-leaved trees of the Belgian Congo.)**
Bull. agric. Congo belge, 1959, **50**: 697-703, bibl. 4.

Of the barks of eight tree species of the Belgian Congo, which were analysed for mineral constituents, organic extracts, alkaloids, glucosides and tannins, those of four were found to merit further study. These are *Dialium lacourtianum* and *Uapaca guineensis* for tannins, *Marquesia macroura* for alkaloids, and *Burkea africana* for organic extracts, tannins and alkaloids.

959. Drobov, V. P., and Čevrenidi, S. H.
Some problems of the biology and introduction into cultivation of *Rheum macrocarpum* A. Los. [Russian, with Uzbek summary.]
Izv. AN UzSSR, Ser. biol., 1957, No. 2, pp. 3-14, bibl. 14, from *Ref. Ž.* (*Biol.*), 1958, No. 11, Abstr. 49,040.

The roots contain 11·2% of high quality tannin.

960. Gilbert, N. W., and Black, D. S.
Canaigré. A potential domestic source of tannin.
Prod. Res. Rep. U.S. Dep. Agric. **28**, 1958, pp. 15, from *Biol. Abstr., Sect. D.*, 1958, **33**, Abstr. 38,834.

Canaigré (*Rumex hymenosepalus*) is a perennial herb indigenous throughout much of the south-western U.S. and northern Mexico. Superior vegetative lines exceeding 35% tannin (dry weight basis) and yielding 15 to 20 tons of roots per acre are being increased by selection. Production of the crop from seed is an ultimate goal of the breeding programme, but is not yet feasible owing to the mixed genetic behaviour of the plant and to poor yields of roots low in tannin content. Regional plantings indicate that canaigré is best adapted as a crop to the warm irrigated valleys of Arizona, New Mexico and Texas. Canaigré culture is similar to that of potatoes and adaptable to the same planting and harvesting machinery. The crop is best adapted to light sandy loam soils and cannot be grown successfully without irrigation. Six to 8 irrigations, totalling about 2 ft. of water applied mostly in March, April, and early May, are required for satisfactory yields. Root crowns are planted in October for highest yields. Except in poor soils canaigré has shown little if any response to commercial fertilizers. No difficult pest control problems have been encountered, although in some cases a leaf spot disease defoliated the plants late in the growing season. Canaigré plants normally die back to the crowns in June, after which the roots are mature and may be harvested during the summer dormant season. Earlier harvest results in lower root yields, reduced tannin content and poor storage quality. The crop may be left in the ground for a second season of growth, nearly doubling the yield. Machine-harvested mature roots have been stored successfully in piles on the ground for periods up to 1 year without loss of tannin, provided they were covered with straw for protection from the sun.

961. Zakirov, K. Z., and Sagatov, S. S.
Trial on the cultivation of *Rumex tianschanicus* in Uzbekistan. (Preliminary communication.) [Russian.]
Tr. Uzb. Un-ta, 1957, No. 67, pp. 3-27, bibl. 9, from *Ref. Ž. (Biol.)*, 1958, No. 11, Abstr. 49,041.
The biology of *R. tianschanicus* and means of introducing it into cultivation. [Russian.]
Izv. AN UzSSR, Ser. biol., 1957, No. 2, p. 89, from *Ref. Ž. (Biol.)*, 1958, No. 11, Abstr. 49,042.

The aerial parts of *R. tianschanicus* contain a relatively large amount of tannins suitable for medicinal purposes. The roots of 1-year-old plants contain 11–12%, and those of 2-year-old plants 16–18%, of lower grade tannins. The yield of dry roots from 2-year-old plants grown under irrigation reached 20–25 t./ha., and that from 3-year-old plants 60 t./ha.

962. Nickol, D. A.
The Bena wattle scheme, Njombe district, Tanganyika.
E. Afr. agric. J., 1959, **25**: 53-8.

History and economic aspects of a large-scale scheme.

Sundry plants.

963. Ryther, J. H.
Potential productivity of the sea.
Science, 1959, **130**: 602-8, bibl. 31.

Organic production by marine plankton algae comparable to agricultural yields on land.

964. Gerlach, J. C.
Bamboos and their uses.
N.Z. J. Agric., 1959, **98**: 583-7, illus.

Methods and costs of constructing lath houses and shelters in nurseries and gardens.

965. Williams, L. O., and Erlanson, C. O.
Brazilian cork. [Spanish summary ¼ p.]
Qual. Plant. Maveg., 1959, **6**: 114-20, bibl. 5, illus.

From *Kielmeyera coriacea*; quality inferior to that from *Quercus suber*.

966. Sheneman, J. M., and Costilow, R. N.
Identification of microorganisms from maple tree tapholes.
Food Res., 1959, **24**(1): 146-51, from *Biol. Abstr., Sect. D.*, 1959, **33**, Abstr. 34,777.

Bacteria, yeasts, moulds and streptomycetes were present.

967. Sheneman, J. M., and others.
Correlation between microbial populations and sap yields from maple trees.
Food Res., 1959, **24**(1): 152-9, from *Biol. Abstr., Sect. D.*, 1959, **33**, Abstr. 34,778.

Control of microorganisms in the tap holes by the use of paraformaldehyde pellets resulted in great increases in sap yield as compared with controls.—Mich. St. Univ., E. Lansing.

968. Singer, O.
Ein Beitrag zur Kenntnis der Mistel (*Viscum album* L.). **(A contribution to the knowledge of mistletoe.)**
Pharmazie, 1958, **13**: 781-3, from *Biol. Abstr., Sect. D.*, 1959, **33**, Abstr. 38,843.

Efforts were made to characterize botanically and chemically the 3 physiological races of mistletoe (apple, fir, pine). Apple and fir mistletoes had longer and wider leaves, which were sturdier and darker green, but were much less uniform than those of pine. There were no great differences in pH of the leaf pressed juice. That of apple mistletoe was most acid (pH 5·5 in winter), while the winter juice of fir mistletoe was 5·8 and that of pine mistletoe 5·6. The summer juice was somewhat less acid. Fir and pine mistletoes had double the ash content (13·06% and 14·34%, respectively) of apple mistletoe (7·96%). The ash content of the stems showed no significant differences. The total acid-insoluble (10% HCl) ash content of the leaves ran about parallel with the total ash content (apple 0·82%; fir 0·68%; pine 0·62%).—Verein f. Krebsforschung, Arlesheim, Switzerland.

969. Steikhardt, H.
Untersuchungen über Sortenwahl, Stickstoffdüngung, Pflanzgutgrösse und Pflanzverband im Korbweidenbau. **(Studies on choice of variety, nitrogen manuring, size at planting and spacing of basket willows.)** [Russian, English and French summaries 14-18 lines.]
Kühn-Arch., 1958, **72**: 376-429, bibl. 67.

Willow yields were dependent on environment, being bigger under wetter conditions, but of better quality in drier situations. Kottenheider was the best variety for yield and quality. Nitrogen manuring increased yields at 40 and 80 kg./ha. but quality was much reduced at 80 kg./ha. Long and strong cuttings grew together within the rows most quickly and in the first two years gave better total yields than weaker cuttings. By the third year, however, differences in yields between large and small cuttings were practically non-existent. Distances between the rows had little effect on yields. Closer planting in the rows produced thinner and longer wands, but ultimately also fewer wands per stock.—Inst. Acker. u. Pflbau, Martin-Luther Univ., Halle-Wittenberg.

FLORICULTURE.

General.

(*See also* 23, 111, 445, 520, 599, 1443, 1447, 1478.)

970. RIES, V. H., FRESE, P. F., AND OTHERS.
Handbook on gardening.
Plants and Gardens, 1959, **15**: 2-97, illus.

This issue is intended as a guide for home gardeners in the United States, and contains articles on how to choose and grow flowers, fruits, vegetables and house plants, on garden practices, on how to make and care for a lawn, and on the fundamentals of landscape design, with lists of plants suitable for the purpose.

971. AALSMEER (WASSCHER, J.).
Jaarverslag van het proefstation voor de bloemisterij te Aalsmeer over 1958. (**Annual Report of the Research Station for Floriculture, Aalsmeer, for 1958**), pp. 117, illus.

Much of the work reported is abstracted separately, but work in progress that is not so treated is listed below: *Carnation:* variety trials, heat treatment for virus control. *Begonia:* comparative variety trials. *Chrysanthemum:* variety trials. *Cyclamen:* "a true to type" trial with the variety White, evaluation of new varieties. *Dahlia:* variety trials. *Forsythia:* a warm water bath for breaking winter dormancy. *Freesia:* growing in boxes or in the open soil, variety trials. *Prunus triloba:* rootstock trials which showed Black Damas C to be unsuitable for late-forced plants; phenological studies on *Enarmonia woeberiana. Rose:* variety trials. *Miscellaneous:* forcing *Iris* spp., *Ornithogalum arabicum*, *Narcissus tazetta*, and *Gladiolus* spp. from Israel, tile drainage, the spread of resistant strains of red spider in Aalsmeer, studies on new acaricides, weed control in various flower crops, soil and water analysis.

972. FJÄDERHANE, A. M., AND ARVIDSSON, L.
Arbetsstudier i trädgårdsodlingen. (**Time and motion studies in horticulture.**)
Medd. Alnarpsinst. trädgårdsekon. Byrån **27**, 1959, pp. 45.

The latest time and motion studies reported upon by the Bureau of Horticultural Economics, Alnarp, concern among other subjects: Transplanting of begonias, hydrangeas and cucumbers; cutting and bunching of adiantum; tying and weeding of chrysanthemums; miscellaneous work in the nursery and in the orchard; the construction and cutting of lawns; and hedge trimming. [For other economic studies see *H.A.*, 28: 1675 and earlier.]

973. THOMBRE, M. V.
Chromosome numbers in some common flowering plants.
Curr. Sci., 1959, **28**: 206-7, bibl. 1.

Chromosome numbers of species of *Hibiscus*, *Ipomoea* (2 spp.), *Mucuna*, *Acalypha*, *Asparagus*, *Parthenium*, *Punica*, and *Rhynchosia* (2 spp.).—Coll. Agric., Poona.

974. VAN DRUNEN, E., AND KAMP, J. R.
Photoperiodic influence on the rooting of cuttings.
Ill. St. Flor. Ass. Bull., 1959, No. 195, pp. 1-3, bibl. 7, illus.

Cuttings of the chrysanthemum varieties Illini Wigwam and Illini Formal, and of *Peperomia obtusifolia variegata*, *Vinca major variegata*, *Fittonia argyroneura* and *Duranta plumieri* rooted better in 9-hour days than in 17-hour days. All the cuttings were struck at 60° F. under mist during December–January.

975. MCCALL, W. W., STINSON, R. F., AND LINDSTROM, R. S.
Soluble salt studies with greenhouse floriculture plants. A preliminary report.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 798-804, bibl. 7.

Greenhouse soils were treated once or twice with a 15 : 10 : 5 liquid fertilizer at various dosages up to 10,000 lb./acre; the soluble salt content was estimated by determining the conductivity of a 1 : 2 soil-water extract, and the effects on 17 ornamentals were observed. African violet, calceolaria, chrysanthemum, cineraria, coleus, geranium, petunia and pilea showed visual signs of distress at conductivities of 80–100 mhos $\times 10^{-5}$. Begonia peperomia, *Philodendron cordatum*, poinsettia, primula and rose stood 100–140 before wilting, while amaryllis, Chinese evergreen and sansevieria tolerated over 140.

976. WASSCHER, J.
Gibberellienen. (**Gibberellins.**)
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 102-3, illus.

Seven spray applications of GA applied at weekly intervals induced strong vegetative growth (in length) in *Pelargonium zonale* and delayed flowering. Similar extended vegetative growth was produced in gloxinias after one spray of 100 mg./l. GA. GA sprayed on to hydrangea plants induced slightly quicker flowering. Flower stalks of Christmas roses became longer after GA sprays, 50 and 10 mg./l. giving the most satisfactory results.

977. LONA, F., AND BOCCHI, A.
Effetti morfogenetici ed organogenetici provocati dalla cinetina (kinetin) su piante erbacee in condizioni esterne controllate. (**Morphogenetic and organogenetic effects of kinetin on herbaceous plants in a controlled environment.**) [English summary ½ p.]
Nuovo G. bot. ital., 1957, **64**: 236-46, bibl. 9, illus., [received 1959].

Kinetin at a concentration of 10^{-4} was sprayed daily for 10 days on the shoots of various plants, including *Perilla ocymoides* var. *nankinensis*, *Centaurea calcitrapa*, *C. cyanus*, *Crepis leontodontoides*, *Aethusa cynapium* and *Aster* [*Callistephus*] *chinensis*. The results included a reduction of apical dominance with a consequent increase of branching, changes in leaf form, and changes in photoperiodic reaction. *P. ocymoides* required only 12 instead of 15 consecutive short days for flower induction when kinetin was applied during the period, but in the long-day species *Crepis leontodontoides* kinetin delayed flowering. In most instances where gibberellic acid was applied with kinetin, their action on shoot growth appeared to be antagonistic.

978. SCHREAD, J. C.
Control of slugs, sowbugs, centipedes, and millipedes in the greenhouse and garden.
Circ. Conn. agric. Exp. Stat. **203**, 1958, pp. 7, illus.

Experiments on control of garden slugs feeding on goldenglow [*Rudbeckia laciniata*], plantain lily (*Funkia* sp.), lily-of-the-valley, hardy chrysanthemums and violets, indicated that a ground treatment of 5% dieldrin granules was much less effective than a foliage spray of 15% dieldrin emulsion. The best results in controlling slugs were obtained with 7% copper dust on marigolds, and with calcium arsenate dust on funkia, violet and goldenglow. Slugs did feed on plants dusted with calcium arsenate, but appeared to be repelled by the copper dust. Calcium arsenate injured some plants. A soil drench of DDT controlled woodlice (*Oniscus asellus*) on greenhouse benches where they had girdled carnation plants. Centipedes were controlled on greenhouse benches with a 10% DDT dust or a soil drench of lindane (25% w.p.). Dieldrin, heptachlor, malathion, endrin, parathion and DDT dusts applied to the soil surface destroyed millipedes that had caused extensive injury to carnation, snapdragon and chrysanthemum plants.

979. BAKKER, J., AND V.D. ELST, A.
Houdbaarheidsproeven met snijbloemen. **(Prolonging the life of cut flowers.)**
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 103-6.

Carnations, freesias and bouvardias, cut in bud, flowered in a sugar solution to which a fungicide was added. Three antibiotics failed to prevent bacterial development in cut flower water. Gerbera flowers in Chrysal (12 g./l.) lasted better than those in water. The quality of *Chrysanthemum carinatum* and *C. maximum* "Esther Read" was improved by chlorine in the water.

Annual and herbaceous plants.

(*See also* 49, 73, 76, 106, 450, 549, 552, 971, 974, 976, 979.)

980. DE SOUZA, H. M.
Observações sôbre épocas de semeação de algumas plantes ornamentais anuais. **(Sowing times for certain annuals.)** [English summary 13 lines.]
Bragantia, 1958, **17**: XV-XVIII.

Twenty annuals were found to fall into 3 time-of-sowing categories in the conditions of Campinas, Brazil, namely, all the year round, e.g. *Dianthus chinensis* and *Gaillardia pulchella*; autumn and winter sowing (March-August), e.g. *Antirrhinum majus* and *Calendula officinalis*; and spring and summer sowing, e.g. *Amaranthus gordonii* and *Zinnia elegans*.

981. BAJPAI, P. N., AND NERIKAR, V. N.
Effect of sowing at different dates on the growth and flowering of cosmos, caryopsis and larkspur.
Sci. and Cult., 1959, **25**: 140-2, illus.

In order to find the best dates for planting to obtain maximum flowering in the cool season in northern India seeds were sown at 10-day intervals from 20 August to 29 October at Kanpur. Details of germination, growth and flowering are given. It is recommended that cosmos be sown from mid-August to mid-September, caryopsis from 20 August to 19 September, and larkspur from the last week in September until the end of October. —Govt agric. Coll., Kanpur.

982. SEYBOLD, A., AND GOODWIN, T. W.
Occurrence of astaxanthin in the flower petals of *Adonis annua* L.
Nature, 1959, **184**: 1714-15, bibl. 3.

Extraction and identification of a pigment not previously reported in petals of higher plants.

983. (BALL, G. J.)
Americans grow dwarf asters all the time.
Grower, 1959, **52**: 795.

A schedule for growing pot asters all the year round with the aid of artificial light.

984. BIK, R. A., AND OTHERS.
Amerikaanse anjers. **(Perpetual flowering carnations.)**
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 19, 23-30, illus.

Carnation plants watered by trickle systems did not show the marked increase of flower yields in the second year of growth that had been apparent in the first year [see *H.A.*, 28: 3920]. A minimum dosage of 100 c.c. Vapam per square metre of bed is required for *Phialophora* control, and at this level Vapam also gives excellent weed control; in the open soil Vapam at the recommended rate gave better control of *Phialophora* than steaming, but it had no effect against *Fusarium oxysporum* on freesias. *Erwinia* was successfully controlled by soil steaming or by treatment with Aretan, Panogen, or Vapam. Parathion-resistant spider mites were successfully controlled by Systox, Metasystox or Amiton. Toxicity symptoms appeared on carnations after applying the following herbicides: CIPC 0·4%, PCP 4%, simazine 0·15%, PCP 4% + CIPC 0·4%, and DNC 0·7%.

985. Sagawa, Y., and Mehlquist, G. A. L.
Some X-ray induced mutants in the carnation *(Dianthus caryophyllus)*.
J. Hered., 1959, **50**: 78-80, bibl. 16, illus.

Three single-flowered mutants were produced by the exposure of plants of William Sim, Pink Sim and White Sim to 5,000 r of X-rays. The mutant from William Sim was male fertile, and evidence is presented that this was a result of 2 independent mutations. [For other X-ray effects see *H.A.*, 28: 669.]—Brookhaven nat. Lab., N.Y., and Univ. Conn., Storrs.

986. Bali, P. N., and Tandon, S. L.
Morphological and cytological studies of the diploid and the colchicine-induced tetraploid in *Iberis umbellata* L.
Phyton, 1959, **12**: 139-46, bibl. 13, illus.

See also *H.A.*, 29: 2815c.

987. Delević, B.
A study on the control of *Heterosporium echinulatum* (Berk) Cooke on carnations. [Yugoslav, with English summary ¾ p.]
Zborn Rad. poljopriv. Fak. Belgrade, 1958, **6**(2): 115-25, bibl. 9, illus.

H. echinulatum is one of the most destructive fungus diseases of carnations in Yugoslavia, causing necrosis on both leaves and flowers. In control trials good results were obtained with 1% colloidal copper "Duphar", with 1 and 1·5% bordeaux and with 1 and 1·5% copper oxychloride. The effectiveness of the two latter compounds was improved by the addition of the stabilizer Emubor. In a very wet season ziram and zineb at 0·3 and 0·4% were less effective. It is recommended that, in areas where the disease has occurred the previous year, carnations should be sprayed 4 times, starting in the middle of June.

988. Peguy, P., and others.
Revision des groupements des meilleures variétés de chrysanthèmes au 18 décembre 1958. **(Revised classification of the best chrysanthemum varieties, 18 Dec. 1958.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 513-17.

Commercial varieties listed in 8 groups.

989. Bonnefond, L.
Méthode de culture pour faire une bonne plant de chrysanthème. **(A method of producing good chrysanthemum plants.)**
Rev. hort. suisse, 1959, **32**: 324-6.

Root suckers, which are used as cuttings, are not allowed to develop on the mother plants until mid-January. Mother plants should be hardy and unmanured. A 5 : 3 : 2 mixture of sand, peat and soil is used as the rooting medium, and the cuttings are ready for transplanting after 20 days at 15-18° C. Tip cuttings, taken early in March and pinched twice, produce plants as large as those from root suckers pinched 3 times, but the tip-cutting plants are shorter, earlier and healthier. The details of potting, re-potting, pinching and manuring are described. Treatments for the control of nematodes and fungus diseases are outlined, and the effects of unbalanced or excess major nutrients and Fe on disease incidence are discussed.

990. Vince, D., and Mason, D. T.
Low temperature effects on internode extension in *Chrysanthemum morifolium*.
J. hort. Sci., 1959, **34**: 199-209, bibl. 8, illus.

A low night temperature was found to have a marked influence on internode length in *Chrysanthemum morifolium*, but the effect varied and depended on variety and stage of growth. During the early stages of growth, or immediately following transfer from long to short days, internode length was reduced at 50° F. (10° C.) or below as compared with 60° F. (15·5° C.). Some varieties, however, showed little response. Internode length was also reduced in short days as compared with long days, and the effects of temperature and day-length appeared to be largely independent. Consequently the greatest reduction in internode length, with the development of a rosette habit, occurred only in short days. Following an extended period of growth in short days, however, the later-formed internodes elongated more at low than at high temperatures. [Authors' summary.]—Univ. Reading, and Cornell Univ., N.Y.

991. Morettini, A.
L'anticipazione della fioritura dei crisantemi con l'uso del polietilene nero. **(Inducing earlier flowering in chrysanthemums with black polythene.)**
Riv. Ortoflorofruttic. ital., 1959, **43**: 218-21, bibl. 2, illus.

Covering the plants with black polythene from 5 p.m. until 9 a.m. for 20 days caused Turner chrysanthemums to begin flowering 20 days early. Covering from 10 a.m. until 2 p.m. did not advance flowering and affected growth adversely.

992. Oertel, C.
Der serologische Test und seine Bedeutung bei der Bekämpfung des Aspermie-Virus an *Chrysanthemum indicum*. **(The serological test and its importance in the control of the aspermy virus of *Chrysanthemum indicum*.)**
Dtsch. Gartenb., 1959, 6: 191-3, bibl. 16, illus.

Of 28 varieties tested 21 were shown to be infected with tomato aspermy virus. The preparation and the application of a TAV anti-serum are described. The validity of the serological test on *Chrysanthemum indicum* depends on (a) using a satisfactory anti-serum, (b) testing during the period February to May, and (c) lowering the temperature during the serological test from 37° to 24° C. Of 18 varieties tested 7 were infected with B-virus. [From author's summary.]—Inst. Phytopath., Martin-Luther Univ., Halle-Wittenberg.

993. (PENNSYLVANIA STATE UNIVERSITY.)
Ray blight outbreak hits Pa. severely.
Flor. Exch., 1959, **133**(10): 8.

Symptoms of ray blight of chrysanthemums [caused by *Mycosphaerella ligulicola*] are described. The spray programme recommended for control is ferbam (1½ lb./100 gal.), applied at 7–10 day intervals until bud formation, followed by zineb, applied at 1½ lb./100 gal. for tight buds and at ½ lb./100 gal. after the flowers open. Strict hygiene should also be practised.

994. WALLACE, H. R.
Movement of eelworms. V. Observations on *Aphelenchoides ritzema-bosi* (Schwartz 1912) Steiner 1932, on florists' chrysanthemums.
Ann. appl. Biol., 1959, **47**: 350-60, bibl. 7, illus.

The adult eelworms were found to move up the stems of chrysanthemums in a stationary film of water, the greatest movement taking place in a thick film in areas thickly covered with epidermal hairs. The leaves were entered through the stomata, and entry rendered the epidermis permeable to water. Dry weather inhibited activity within the leaves, but rain induced movement through the mesophyll and across the veins. Emergence was also through the stomata, and 50% of the population emerged in one hour from a wetted leaf.—Rothamsted exp. Stat.

995. PLUMMER, J. C.
Treatment gives complete control of eelworm.
Grower, 1959, **52**: 303-5.

A grower's experience with heat therapy for control of viruses and eelworms in chrysanthemums.

996. (CRAIG, R., AND WALKER, D. E.)
Germinating geranium seed.
Pa Flower Grs' Bull., reprinted in *Flor. Exch.*, 1959, **133**(4): 35.

Tests with geranium seeds showed that scarification by various methods greatly improved germination. The recommended procedure is to puncture each seed with a sharp needle, and to germinate these seeds on moist filter paper at 70–80° F. A germination percentage of about 90% can be expected. Various other treatments, including soaking seeds in GA, sulphuric acid, boiling water and cold water, did not improve germination.

997. GARTHWAITE, J. M., AND IBBETT, W. C.
Gerberas.
Agriculture, Lond., 1959, **66**: 138-40, illus.

Notes are given on propagation by seed and by very small stem cuttings with a piece of rhizome attached but with no roots, on culture in cold or heated greenhouses, and on fertilization, pests, diseases and cutting and packing for market. [See also *H.A.*, 29: 3868.]

998. V.D. ZWAARD, P., KOEK, P. C., AND SCHOLTEN, G.
Gerbera. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 67-71, illus.

About 60 young plants could be obtained from one large gerbera plant by division into leaf cuttings (preferably consisting of 1 or 2 leaves and a piece of rhizome) and root cuttings (rhizome pieces). After treating nematode-infested soils with various nematicides, growth was best in plots treated with D-D or Bo 105 (an experimental material). Infection studies on foot rot have shown that two types of wilt occur, one caused by *Verticillium* and the other by *Fusarium*.

999. BIK, R. A., AND HELLE, W.
Gloxinia. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 71-3.

The addition of leaf mould to potting composts had an unfavourable effect on growth, but growth improved as the pH of the compost increased. Parathion gave the best control of *Aphelenchoides olesistus*.

1000. BURNS, R. E.
Effect of acid scarification on lupine seed impermeability.
Plant Physiol., 1959, **34**: 107-8, bibl. 9, illus.

Anatomical study of entry of liquid following sulphuric acid treatment.

1001. SAITO, K.
Studies on the value and seed production of autotetraploid flowers. II. The morphology and reproduction of the induced autotetraploid rose campion. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 139-42, bibl. 4, illus.

The autotetraploid form of *Lychnis coronaria* has thicker stems and leaves and larger flowers than diploid forms; it also grows more slowly in the rosette stage and starts flowering several days later. Pollen and seed fertility of autotetraploids was highest in plants kept at 23–26° C. [For part I see *H.A.*, 29: 3872.]

1002. HEMMING, E. S.
The hardy herbaceous mallows.
Nat. hort. Mag., 1959, **38**: 143-4, illus.

The improvement of herbaceous *Hibiscus* hybrids.

1003. Jauhari, O. S., Sharma, R. R., and Dubey, K. C.
Phylogenetic observations in phlox.
Sci. and Cult., 1959, **25**: 277-8, bibl. 1, illus.

1004. Stinson, R. F.
New twists in African violets.
Mich. Flor., 1958, No. 334, p. 24, reprinted in *Ill. St. Flor. Ass. Bull.*, 1959, No. 194, p. 8, illus.

Propagation. Bottom heat of 70–75° F. with an air temperature of 65° F. has advanced rooting of several saintpaulia varieties by some weeks. Blue Fairy Tale plants were grown more rapidly from seed than from cuttings. *Fertilizers.* For cuttings a complete liquid fertilizer at half-strength should be given every 2 weeks from the appearance of roots until potting up. Seedlings require 2 feeds of liquid fertilizer, one at germination and a second 2 weeks later. Potted plants may be fertilized in the water used for watering, or by mixing a slowly-available fertilizer in the potting soil. *Temperature.* A night temperature of 70–75° F. and a day temperature of 65° F. are desirable. *Diseases.* Crown rot can be controlled by a soil drench of ferbam, and nematodes by a soil drench of VC-13 Nemacide. Cyclamen mite can be controlled with Kelthane.

1005. Eberhardt, F., and Haupt, W.
Über Beziehungen zwischen Anthocyanbildung und Stickstoffumsatz. **(On the relationship between the synthesis of anthocyanin and the conversion of nitrogen.)**
Planta, 1959, **53**: 334-8, bibl. 4.

In *Saxifraga crassifolia*.

1006. Sampson, D. R., and Hunter, A. W. S.
Inheritance of shades of bronze and pink flowers of *Antirrhinum majus*.
Canad. J. Plant Sci., 1959, **39**: 329-41, bibl. 14.

1007. Hess, D.
Die selektive Blockierung eines an der Blühinduktion beteiligten Ribosenucleinsäure-Eiweiss-Systems durch 2-Thiouracil. (Untersuchungen an *Streptocarpus wendlandii.*) **(The selective blockage by 2-thiouracil of a ribonucleic-acid-protein system associated with the induction of flowering. Studies on *Streptocarpus wendlandii.*)**
Planta, 1959, **54**: 74-94, bibl. 53, illus.

1008. Streeter, W.
Winter flooding is essential for sweet peas.
Grower, 1959, **52**: 809-10.

The method used at the Plumpton Farm Institute is described, by which sweet peas sown under glass in the first half of October flower within the last 6 days of April. Before sowing the soil is flooded to reduce pC and to provide moisture for the early stages of growth.

1009. Ellis, J. R., and Burton, M. A.
Sterility in *Lathyrus odoratus* L.
Nature, 1959, **184**: 204-5, bibl. 5, illus.

Cytological behaviour of a form showing both male and female sterility.

1010. Forsberg, J. L.
Sweet pea diseases.
Ill. St. Flor. Ass. Bull., 1959, No. 195, pp. 4-6, bibl. 14, illus.

Symptoms and control of fungus, bacterial and virus diseases.

Bulbs, tubers, etc.

(*See also* 552, 869, 971, 975, 1448.)

1011. Horton, D. E.
Bulbs.
A.R. Rosewarne exp. Hort. Stat. 1958, 1959, pp. 28-47.

Nutrition: Narcissi, tulips and irises produced the best results in plots with a good K content. The importance of dung, alone or combined with K, was apparent in tulips and irises. The trials were carried out in a soil low in K. Nitrogen top dressings, applied in addition to a complete base dressing, did not improve the results obtained with narcissi. *Lifting methods:* Observations indicated that for narcissus bulbs: (1) The modern type of potato elevator used was much better than a 16-in. plough which tended to mix the bulbs with the soil; and (2) ridges should be 30 in. apart centre to centre. *Narcissus weed control:* PCP caused no damage in any of the plots, and the control of weeds, except annual meadow grass, was good. Sodium chlorate, sodium arsenite and CICP proved less successful. *Tulips, hot water treatments* (*H.W.T.*). In tests with two varieties the date of lifting did not appear to have any significant effect on Krelage's Triumph, but the advantage of 4 weeks' storage at 70°–75° F. before H.W.T. was very evident in both varieties. *Trace elements.* Experiments are in progress with narcissus. No significant results have yet been produced, but it may be of interest to record that the greatest percentage increase in weight of bulbs lifted over weight of bulbs planted was from plots treated with Mn. *Irrigation.* The total number of narcissus blooms was increased significantly by watering. *Destruction of bulb foliage and weeds.* Burning at the end of the growing season caused no injury to narcissus bulbs in the soil and produced better results than any other method so far tested. A description is given of the machine evolved. *Freesia production from seed.* Date of sowing trials gave inconclusive results, but the incidence of abnormal flowers appeared to be related to the time of sowing as well as to the type of shading or mulch. *Mobile glasshouse.* Tulips, irises and gladioli again formed the rotation for the period November–June. Care was taken not to press the tulip or narcissus bulbs into the soil too much, as it is important to avoid consolidation of the soil underneath the bulb. Tulip bulbs were planted on the surface on 1 and 2 Oct., and a mulch of peat, 2 in. thick, was then spread over the whole site. On Nov. 20 the peat covering was removed and the house moved over the site until the 12 March. After the latter date adjacent plots were covered. The best quality tulip flowers were produced from 11–12-cm. bulbs. For cropping tulips the whole plant was pulled and the bulb was cut or broken off and discarded. Iris bulbs were planted 4 in. deep to the base of the bulb, the spacing suggested being 2 in. within the row and 4 in. between rows. The percentage of flowers produced and the duration of the flowering period are tabulated for iris varieties. In general, locally grown stocks proved superior to imported bulbs for the production of early flowers.

1012. JEFF, A. E.
Anemones.
A.R. Rosewarne exp. Hort. Stat., 1958, 1959, pp. 6-16.

Manurial trials: Plots in which a good balance of P and K has been maintained show the highest yields together with plots supplied with dung. *pH plots:* One season's experiments showed that acid conditions affect anemones severely. At a pH of 3·5–5·0 no emergence took place and values of 5·0–6·5 resulted in very slow emergence and growth. Growth improved at 6·5–7·0 and above 7·0 it was normal. No further improvement took place at values above 7·5. *Time of planting and corm size:* Dates of planting compared were 29 May, 19 June, 10 and 31 July. The earliest plantings gave the highest total yields, but peak cropping occurred in October, and production, particularly in plants from the largest corms ($\frac{3}{4}$ cm.), fell during January and February when the flowers were most valuable. *Disease control:* Downy mildew (*Personospora ficariae*) continues to be a major problem, and work is being concentrated firstly on the control of the oospore stage in the soil and secondly on the prevention of the aerial spread of the disease during the summer months. Soil treatments with sodium-m-dithiocarbamate at 120 and 60 gal./acre raised the yield of marketable flowers over that of the controls by 105·7% and 80·1% respectively. Of the different sprays tested captan proved much the best, particularly in producing a higher crop during February and March. *Weed control:* PCP at 12 lb./acre, applied 4 days before emergence, was both safe and effective, weed control being better under dry than under wet conditions. *Protection from weather:* The most effective structures were those in which a side protection, either of glass or polythene, was in position permanently and the top cover of glass was used only during periods of frost and high wind. *Black polythene:* Experiments on mulching have been started.

1013. V.D. ZWAARD, P., AND OTHERS.
Anthurium andreanum. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 31-4, illus.

Sphagnum gave the best results of 5 soil media in promoting growth and flowering of *Anthurium andreanum.* Two new trials on soilless culture have been started: in the pilot trial ground pumice shows promise as a substrate; in the large-scale glasshouse trial there are indications that soil temperature is of particular importance to anthuriums. *Galumna climatus* was successfully controlled by a BHC spray.

1014. SCHMITT, R. J., BIK, R. A., AND SCHOLTEN, G.
Cyclamen. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 45-52.

Studies of various potting mixtures showed that cyclamen quality was closely related to soil characters, and the best mixtures were those containing granulated peat; as the pH of the compost decreased plant mortality increased, but increasing salt contents also had a detrimental effect. Plant diameter was related to water availability, which was optimal at 35–40%. A soil ball dip of TMTD gave satisfactory control of *Cylindrocarpon* rot, but captan was more effective against *Thielaviopsis*; seed germination was not affected by fungicide incorporation into the soil, but seedling growth was delayed with TMTD at levels above 1 kg. per cu.m. of soil. For *Botrytis* control TMTD, B 500 and griseofulvin showed the most promise.

1015. WELLENSIEK, S. J.
The effect of inbreeding in cyclamen. [Dutch summary $\frac{1}{4}$ p.]
Euphytica, 1959, **8**: 125-30, bibl. 3.

In order to establish the effect of inbreeding in *Cyclamen,* one mother plant of "Rose van Aalsmeer" was used to produce successively 5 inbred generations, I_1, I_2, I_3, I_4, and I_5 Similarly, one mother plant of "Wit met oog fimbriata" was used for the production of an I_1, an I_2 and an I_3. By keeping the mother plants alive plants could be obtained, which, although belonging to different generations, were of the same age. Comparison of the numbers of flowers formed by these plants during their first season showed a clear effect of inbreeding, especially in the I_3, I_4 and I_5, consisting of a significant reduction of the mean number of flowers. When two inbred lines, either of one variety or belonging to the two different ones, were crossed, the F_1 reached the level of the I_1. In both cultivars there were rather large differences among individual lines, some showing a strong effect of inbreeding, while in others the effect was only slight or sometimes even absent. [Author's summary.]—Lab. TuinbPl., Wageningen.

1016. Stichel, E.
Gleichzeitige Induktion von Sprossen und Wurzeln an in vitro kultivierten Gewebestücken von *Cyclamen persicum*. **(The simultaneous induction of shoots and roots in portions of cyclamen tissue cultured *in vitro*.)**
Planta, 1959, **53**: 293-317, bibl. 47, illus.

The addition of achromycin to the culture medium containing NAA had no effect on the extent of callus formation or root production in portions of cyclamen corms, but slightly retarded these processes.—Bot. Inst., Univ. Erlangen.

1017. Société Nationale d'Horticulture de France.
Les meilleures variétés de dahlias obtenues en 1952 à 1958. **(The best dahlia varieties obtained from 1952 to 1958.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 509-12.

With very brief descriptions.

1018. Yasuda, I., and Yokoyama, N.
Effect of day length on growth and root formation of dahlia. I. Short-day treatment in summer. [Japanese, with English summary ½ p.]
Sci. Reps Fac. Agric. Okayama Univ., 1959, No. 13, pp. 57-62, bibl. 4.

In an experiment on Hanagasa dahlias during April to September the treatments were control and 13-, 10- and 7-hour days. The number of flowers produced was greatest in the 13-hour photoperiods (446), followed by the 10-hour (235), the control (211) and the 7-hour (158). The number and weight of fibrous roots increased with day length. The weight ratio of tuber to aerial portion was at a maximum in the 10-hour photoperiod followed by the 7-hour, the control and the 13-hour. Stem height and number of nodes were not greatly affected.

1019. Saxton, S. E.
New developments in daylilies.
Gdn J. N.Y. bot. Gdn, 1959, **9**: 130-1, 140, illus.

More vigorous, brighter coloured and double varieties.

1020. Zubkus, L. P.
The longevity of pollen of *Erythronium sibiricum* (Fisch. et Mey). [Russian.]
Izv. vost. Fil. AN SSSR, 1957, No. 7, pp. 122-4, from *Ref. Ž.* (*Biol.*), 1958, No. 12, Abstr. 53,900.

Isolated pollen of *E. sibiricum* kept under room conditions lost its viability in 30 min. When whole plants were kept in a refrigerator the pollen remained viable for several months. Similarly, when plants in the field were artificially covered with frozen snow the pollen remained viable for practically the whole of the growing season. The author connects the pollen characteristics of *E. sibiricum* with its "under snow" development.

1021. Kragtwijk, C., and Bik, R. A.
Freesia. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 54-67.

The amount of leaf scorch was little affected by shading the crop for certain periods or throughout its growth; shading the plants during the early stages of growth (June–August) increased seed production by 15%, and flower production by 100% or more, compared with later shading. Pre-germinated seed produced a better stand and more flowers than seed not pre-germinated. After storage at 13° C. to induce cormlet production, freesia corms were held at 30° C. before planting; flowering began in August from plantings made in early May, but flowering became later as planting was delayed. Flower production increased with soil pH from 5·1 to 7, and flower stems also became longer with increasing pH. Increasing temperatures (by 7–8° C.) during the last weeks of growth induced earlier flowering, but a weak crop. Seedbed sprays of PCP with CIPC or simazine gave good weed control, but simazine sprays were somewhat toxic.

1022. Rijkstuinbouwconsulentschap, Hoorn.
Rooitijdenproef bij de gladiool. **(Trial on the time of lifting gladioli.)**
Weekbl. BloembollCult., 1959, **70**: 190.

Late lifting of Johan van Konijnenburg and Bloemfontein corms resulted in an increase in numbers of diseased corms, and their colour was often poor. Corms lifted early or at the normal time were best in appearance and keeping quality.

1023. Swenson, K. G., and Nelson, R. L.
Relation of aphids to the spread of cucumber mosaic virus in gladiolus.
J. econ. Ent., 1959, **52**: 421-5, bibl. 31.

A survey of aphids, most of which appear to be vectors of CMV.

1024. Halevy, A. H.
Forcing of Wedgewood iris.
Reprinted from *Flor. Rev.*, March, 1959, pp. 2, bibl. 3, illus.

The effects of various treatments on the flowering of iris bulbs imported from Israel were observed. The emergence of cured and non-cured bulbs, and of bulbs of different sizes stored at different temperatures, did not differ significantly; bulbs that had been stored at 50° F. emerged sooner than those stored at 55° or 60° F. Heat curing at 90° F. for 10 days had no effect on bulbs subsequently stored at 65° F. With storage at 55° F. smaller bulbs were also not affected by previous heat curing, but larger bulbs (10–11 cm.) produced longer stems and fewer blasted bulbs and showed earlier average flowering. With storage at 50° F. previous heat treatment did not affect 8–9 cm. bulbs, benefited 9–10 cm. bulbs and severely damaged 10–11 cm. bulbs. Bulbs of 10–11 cm. were most satisfactory for forcing. Continuous storage at 65° F. adversely affected flowering. Following 55° F. storage the percentage of flowering was the highest, but the stems were slightly shorter than those from bulbs stored at 50° F.

1025. Bakker, J., and Helle, W.
Lelies. **(Lilies.)**
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 74-83, illus.

Orange Triumph lilies forced in fresh soil produced better quality plants, and flowered more quickly, than those forced in soil which had previously been used for forcing *Lilium regale*. Storage of *Lilium regale* at 17° C. for periods exceeding 10 days resulted in growth inhibition, reduced stem length, fewer and later flowers, and some flower and plant malformations; storage for 4–10 days at 17° C. followed by 2° C., to give a total storage period of 60 days, stimulated growth and advanced flowering by about 2 weeks. *Lilium regale* bulbs from which seed had been saved showed much poorer forcing quality than bulbs from which the flowers had been removed in the season before forcing. Shortage of light during the forcing of *Lilium regale* resulted in later flowering, fewer flower stalks, and fewer flowers per stalk; light from high pressure mercury lamps resulted in quicker flowering and better flower quality than light from fluorescent lamps. Bulbs of *Lilium speciosum rubrum* (size 16/18) did not respond well to temperature treatments, but results with large bulbs are expected to be better. The presence of *Aphelenchoides fragariae* was not revealed by flower abnormalities but was indicated by grey colour and wrinkling of the leaves.

1026. Tuan, H.-C.
Research on the development of chloroplasts in several bulbous plants. [Chinese, with English summary ½ p.]
Acta bot. sin., 1959, **8**: 15-24, bibl. 43, illus.

In leaves of narcissus and hippeastrum.

1027. Collingwood, C. A.
Control of bulb scale mite with endrin.
Plant Path., 1959, **8**: 98, bibl. 1.

Foliar feeding by *Tarsonemus laticeps* on boxed narcissus bulbs was almost entirely suppressed by watering the soil with 0·1% endrin. Treatment with demeton-methyl was followed by increased mite activity, which is considered to be a result of the destruction of natural predators.—N.A.A.S., Shardlow.

1028. Kragtwijk, C.
Ornithogalum. Bewaar- en teeltproeven. ***(Ornithogalum thyrsoides.* Storage and cultural trials.)**
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 84-9.

In comparing bulb sources, imported bulbs began to flower earlier than those prepared in Holland, but differences in quality were slight. Young bulblets were most successfully grown to flowering size under glass, or in boxes kept fairly dry at temperatures above 10° C. Seed of *Ornithogalum*, sown at the end of November and planted out in May, produced 60% of flowering plants; close planting gave higher production per square metre, and probably a higher percentage of flowering plants.

1029. Hagiya, K., and Amaki, W.
Studies on offsets of tulip bulbs. III. The effect of cultural conditions on offset formation. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 130-8, bibl. 8, illus.

William Pitt and Kansas tulip bulbs tended to form more offsets with shallow planting and when grown in wet rather than drier soils, in soils with a low water table, in soils with a relatively high CO_2 content, and in neutral rather than acid or alkaline soils. Various nutrient levels and photoperiodic treatments applied from leaf emergence showed no consistent effect on offset formation. [For part II see *H.A.*, 29: 3895.]

1030. Silver, C. N., and Slootweg, A. F. G.
Zwartbenigheid in tulpen. **(Black leg of tulips.)**
Weekbl. Bloemboll. Cult., 1959, **70**: 230.

Black leg of tulips in Holland is associated with a sclerotinia-forming fungus and with a second fungus not yet identified. Bulb disinfection with AApedint [TCNB ?] and Brassicol [PCNB] was very successful, and organic mercury compounds were also effective when bulbs were planted in healthy soil. Bulb disinfection was ineffective for planting in diseased soil. Brassicol was the most effective material for soil disinfection.—PlZiekt. Dienst, Wageningen, and Lab. Bloemboll Onderz., Lisse.

1031. Brederode, C. W.
Waarom huidscheuren bij tulpen op de droogvloer? **(Why do tulip bulb skins split in the dryer?)**
Weekbl. BloembollCult., 1959, **70**: 72, illus.

The effect of circulating air with a relative humidity too low for satisfactory bulb drying may be mitigated by re-circulating some of the air which has passed through the bulbs with freshly heated air from outside the store. A diagram of a possible structure is provided.

1032. Sachar, R. C., and Kapoor, M.
Gibberellin in the induction of parthenocarpy in *Zephyranthes*.
Plant. Physiol., 1959, **34**: 168-70, bibl. 8, illus.

More effective than IAA and kinetin.

Lawns and sports turf.

(*See also* 550, 566-572, 972, 1437, 1446.)

1033. Ziegler, G. A.
Home lawns.
Circ. Univ. Wis. Ext. Serv. **445**, revised 1958, pp. 8, illus.

Making a new lawn, grass varieties and maintenance.

1034. Basteleus, R.
Une belle pelouse sous les arbres. **(A good lawn under trees.)**
Bull. hort. Liège, 1959, **14**: 313-17, illus.

Establishment and maintenance.

1035. Juska, F. V., and Hanson, A. A.
Evaluation of cool-season turfgrasses alone and in mixtures.
Agron. J., 1959, **51**: 597-600, bibl. 12.

Merion Kentucky bluegrass seeded alone produced the highest quality turf for 4 years, but succumbed to stripe smut (*Ustilago striiformis*) in the fifth year. In that year the highest quality turf was obtained from 75% Merion with 25% red fescue. Common Kentucky bluegrass mixed with red fescue was significantly superior to common bluegrass seeded alone. Colonial bentgrass was the most aggressive species planted.—U.S.D.A., Beltsville, Md.

1036. Skogley, C. R., and Engel, R. E.
Better lawn seed mixtures.
Ext. Bull. N.J. Coll. Agric. Rutgers **318**, 1959, pp. 8.

Suggested mixtures for New Jersey conditions.

1037. Duich, J. M., and Musser, H. B.
The extent of aberrants produced by Merion Kentucky bluegrass, *Poa pratensis* L., as determined by first and second generation progeny tests.
Agron. J., 1959, **51**: 421-4, bibl. 6.

Commoner from polyembryonic than from normal seeds.

1038. Kreitlow, K. W., and Juska, F. V.
Susceptibility of Merion and other Kentucky bluegrass varieties to stripe smut *(Ustilago striiformis)*.
Agron. J., 1959, **51**: 596-7, bibl. 8, illus.

In field plots Merion Kentucky bluegrass was appreciably more susceptible to stripe smut than other varieties and selections of bluegrass.—U.S.D.A., Beltsville, Md.

1039. Boyle, A. M.
Lawn diseases in Arizona.
Tech. Bull. Ariz. agric. Exp. Stat. **136**, 1959, pp. 16, bibl. 29, illus.

Details are given of 14 fungal diseases of lawn grasses, with accepted methods of control. The eradication of certain saprophytic fungi from lawns is discussed, and 6 diseases which affect either clover, *Dichondra* or *Lippia*, often grown in lawns, are also described. Ways of dealing with the nematodes, which caused root knot in these three plants, are outlined.

1040. Britton, M. P.
Diseases of lawns.
Ill. St. Flor. Ass. Bull., 1959, No. 194, pp. 3-4.

Symptoms, and fungicides for control.

1041. Cole, H., Jr., and Burke, O. D.
Control turf and lawn diseases.
Circ. Pa agric. Ext. Serv. **492**, 1959, pp. 7, illus.

Symptoms and control.

1042. Burton, M., and Hutchins, R. E.
Biology and control of chinch bugs on Mississippi lawns.
Inf. Sheet Miss. agric. Exp. Stat. **610**, 1958, pp. 2.

See *H.A.*, 29: 2775.

Foliage and succulent plants.

(*See also* 48, 972, 974, 975.)

1043. Brown, A. N.
Maleic hydrazide treatment of indoor foliage plants.
Lasca Leaves, 1959, **9**: 38-40, illus.

Spraying *Dieffenbachia roehra superba* and *Aralia elegantissima* with maleic hydrazide at concentrations ranging from 500 to 2,000 p.p.m. reduced leaf size and stem length while encouraging branching. The optimum concentration appeared to be 1,500 p.p.m.

1044. Rünger, W.
Über den Einfluss der Temperatur während verschiedener Zeitabschnitte der Kurztagperiode auf die Blütenbildung von *Kalanchoe blossfeldiana*. **(The effect of temperature during various portions of short-day periods on flower formation in *Kalanchoe blossfeldiana*.)**
Planta, 1959, **53**: 602-11, bibl. 10.

Kalanchoe plants, undergoing a 12-day inductive period of short days, responded best to alternating temperatures of 20–25° C. and 15° C. With daily variations it was not important whether the day or night temperatures were high or low, but, when there was only one change during the whole short-day period, it was better to give the higher temperature before the lower. [For earlier results see *H.A.*, 29: 1730.]—Inst. ZierpflBau tech. Hochsch., Hannover.

1045. Scaramella Petri, P., Mazzi, S., and Tampieri, A.
Considerazioni comparative sui processi di riparazione delle Phytolaccaceae e delle Cactaceae. (**Comparative observations on the healing processes of the Phytolaccaceae and Cactaceae.**)
Nuovo G. bot. ital., 1957, **64**: 455-84, bibl. 66, illus., [received 1959].

Anatomical studies of wound healing in *Phytolacca decandra* and *P. dioica* are described in detail. Similarity to the corresponding processes in the Cactaceae adds evidence to that from other sources, that these families are related.—Univ. Bologna.

1046. Helle, W.
Varens. Bestrijding dopluis in *Platycerium*. (**Control of *Coccus hesperidum* on *Platycerium*.**)
Jversl. Proefst. Bloem. Aalsmeer, 1958, p. 101.

Regular sprays of Phosdrin or summer oil gave complete control of *Coccus hesperidum* and are also recommended for its control on other ferns [a footnote states, however, that other work has indicated that Phosdrin is phytotoxic to *Adiantum*].

1047. Gerlach, W.
Untersuchungen über die *Fusarium*-Blattfleckenkrankheit an *Sansevieria*-Arten und ihren Erreger (*Fusarium moniliforme* Sheld. var. *minus* Wr.). (**Studies on *Fusarium* leaf spot disease of sansevierias and its causal organism.**) [English summary ¾ p.]
Phytopath. Z., 1959, **36**: 270-85, bibl. 20, illus.

Fusarium moniliforme var. *minus*, including a discussion of possible control measures.

Orchids.

1048. Magli, G.
Possibilità di sostituire con auxine l'azione del polline per lo sviluppo degli ovuli delle orchidee. (**The possibility of replacing pollen by auxins to develop the ovules of orchids.**) [English summary ¼ p.]
Nuovo G. bot. ital., 1958, **65**: 401-16, bibl. 12, illus.

Ovule development was induced in *Paphiopedilum barbatum* var. *grandiflorum* by treating the flower stigmas once with 1% NAA in lanolin, but a high proportion of the ovules of treated flowers degenerated during the later phases of meiosis, only a minority producing female gametophytes.

1049. Helle, W.
Orchideeënsnuitkever in *Paphiopedilum callosum*. (**Orchid weevils in *Paphiopedilum callosum*.**)
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 83-4, illus.

Control of *Acythopeus aterrimus* by spraying with 0·2% Thiodan emulsion at 3-week intervals for 3 months.

Roses.

(*See also* 18, 971.)

1050. Boskoop (Dorsman, C.).
Korte samenvatting van de genomen proeven op de Proeftuin te Noordbroek in 1958. (**A short summary of experiments at the Experimental Garden, Noordbroek, in 1958.**)
Jaarb. Proefst. Boomkw. Boskoop, 1958, pp. 53-4.

Selected canina stocks did not need cross-pollination to produce good seeds. Certain crops had a bad effect on the growth of *Rosa canina* and *R. laxa* grown after them. The growth of one-year-old canina seedlings was excellent after 10 weeks in a cold store at —3° C.; one-year-old stocks of canina could be kept in cold storage for 8–10 months. Broggs, *R. inermis* and Schmidts Ideal were the best stocks for glasshouse roses. Good results with roses in the open were obtained with Heinsohn's Rekord, Pollmers, *R. inermis* and *R. multiflora*. Zinc fungicides gave the best results against *Peronospora sparsa* on canina.

1051. van Marsbergen, W., Bik, R. A., and Marchal, J.
Rozen. (**Roses.**)
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 90-9.

In the first year of a rootstock trial the largest number of first quality flowers of Baccara were produced on *Rosa indica major*. *Rosa polmeriana* and *R. rugosa* were the best stocks for the polyantha varieties Queen Lucia and Dorus Rijkers. Roses grown in raised beds gave the best results in a humus-rich mixture. Iron deficiency was effectively corrected by soil applications of 3 chelate compounds, but Mn deficiency sometimes appeared later in the season. Mildew was well controlled by streptomycin sprays. Simazine (1–1½ kg./ha.) was best for weed control in outdoor roses; a spring and an autumn application are recommended, with 2 hoeings in between.

1052. Fritzsche, W.
Arbeitswirtschaftliche Untersuchungen bei Rosen unter Glas. (**Labour studies on glasshouse roses.**)
Dtsch. Gartenb., 1959, **6**: 204-6.

Monthly analyses, made during 2 years, are presented in the form of graphs of labour requirements (as hours/1,000 sq. m., units/1,000 sq. m., and hours/1,000 plants). Labour requirements for roses were highest in July (1·77 labour units/1,000 sq. m.) and lowest in December (0·23 labour units/1,000 sq. m.). The ratio of productive area to total area was 1 : 1·3. The percentage of the total time taken by 16 separate cultural jobs is also shown; cutting and marketing accounted for 44·3% of the total time spent on the roses.—Inst. Gartenb., Dresden-Pillnitz.

1053. Majčenko, Z. G.
The essential-oil rose Novinka [Novelty]. [Russian.]
Selekcija i Semenovodstvo, 1957, No. 4, p. 47, from *Ref. Ž.* (*Biol.*), 1958, No. 12, Abstr. 53,883.

This variety, developed at the Crimean zonal Experiment Station, is distinguished by winter hardiness, low susceptibility to downy mildew and rust and resistance to spider mites and some other pests. Its essential oil content is more than twice that of the Pink essential-oil rose and more than 3 times that of the Red rose. Under unfavourable conditions in 1955 Novinka produced 19·25 centners/ha. of flowers yielding 3·85 kg. of high quality essential oil, while under more favourable conditions in 1956 the Red rose produced 17·1–18·4 centners/ha. of flowers and only 1·7–1·8 kg. of oil.

1054. de Souza, H. M., and Inforzato, R.
Enraizamento de estacas de roseires porta-enxertos. (*Rosa canina* e *R. chinensis.*) **(Rooting of the rootstock roses, *Rosa canina* and *R. chinensis.*)** [English summary 9 lines.]
Bragantia, 1958, **17**: v-viii, illus.

The 5 hormone products tested all gave a high percentage of successful rooting, the best results being obtained with IBA and NAA. The roots were more numerous and more vigorous and the foliage better in the treated than in untreated cuttings.

1055. (Mahlstede, J. P.)
Waxing hybrid rose canes improves keeping quality.
Ia Fm Sci., 1959, **13**: 279, illus.

Waxed plants can be held for 3 weeks in storage at 40° F. followed by 2 weeks in a greenhouse at 70° F. without injury. Disease risks are minimized because high-humidity storage conditions are not necessary. Plants can be forced to bloom sooner, disbudded to force supplementary buds or pruned to slightly longer lengths. The upper temperature limit for waxing should be 190° F. for not more than 3 seconds. For quick dipping the temperature limits are 190–210° F.

1056. Ealy, R. P.
The growth response of potted Talisman rose plants as related to desiccation.
Proc. Okla. Acad. Sci. 1957, 1958, **38**: 28-9.

A study is reported on the growth responses of rose plants to various treatments between the arrival of packaged plants and their potting up. Growth was slowest when the roots of the plants had been subjected to some desiccation before potting. The best response was obtained from plants that had been conditioned at room temperature for 3 days before potting. Plants potted immediately on arrival were damaged by a frost on their first night in a lath house.—Okla. St. Univ., Stillwater.

1057. Hotin, A. A.
Phasic development in some essential oil plants. [Russian.]
Agrobiologija, 1959, No. 2, pp. 231-5.

The light and temperature requirements of many essential oil plants including roses are discussed. The Crimean Red rose flowered more freely following 41 days below 10° C. than after 27 days at similar temperatures, and plants held at average daily temperatures below 10° C. for only 9 days did not flower at all.

1058. (Durkin, D.)
Pinching roses.
Flor. Exch., 1959, **133**(3): 12, 13.

Tests at Ohio State University showed that the extra soft or Robert's pinch (made when the third 5-leaflet leaf is about to unfold) did not encourage the production of appreciably more bottom breaks than the ordinary method of soft pinching (made to the 3rd or 4th 5-leaflet leaf when the flower bud is the size of a pea). However, flower production from the Robert's pinch was higher than that from soft pinching.

1059. Eygenraam, H.
Bestrijding van sterroetdauw in rozen. **(Control of black spot on roses.)**
Jaarb. Proefst. Boomkw. Boskoop, 1958, pp. 57-60.

Both zineb and thiuram plus sulphur gave almost complete control of black spot on roses, and thiuram + sulphur also reduced mildew infection. The least number of sprays applied (5 times between 30 June and 26 August) gave control equal to that of 7 and 9 spray applications. Phaltan also showed promise for black spot control. Thirty-two rose varieties were classified according to their susceptibility to black spot disease.

1060. Anon.
This curbs rose spot.
Agric. Res., Wash., 1959, **8**(1): 16, illus.

See *H.A.*, 29: 3916.

1061. Mokrickaja, M. S.
Specialization of rust on species and varieties of *Rosa* in the Leningrad region. [Russian.]
Bot. Žurnal, 1959, **44**: 830-6, bibl. 25.

In artificial infection experiments *Phragmidium rosae-pimpinellifoliae* was found mainly to attack wild species of *Rosa* belonging to the sections *Pimpinellifoliae* and *Caninae* which have a similar geographical distribution. Among cultivated roses, varieties of the floribunda group showed very mild infection. *Phragmidium disciflorum* appeared to be better adapted to attacking cultivated roses, in particular members of the floribunda group (derived from *R. gallica*, *R. damascena* and *R. chinensis*), and hybrids of park [*sic*] roses (derived from *R. rugosa*, *R. alba* and *R. centifolia*).

1062. NEISWANDER, R. B., AND RUNNELS, H. A.
Control of the pests of roses.
Ohio Fm Home Res., 1959, **44**: 31.

The work carried out on rose pests and diseases for the past 7 years has shown that only by using a combination of an insecticide, an acaricide and a fungicide can roses be kept free from injury. The frequency and thoroughness of application has proved more important than the choice of preparation.

1063. JACKSON, G. A. D., AND WOOD, R. B.
Presence in rose hips of substances inhibiting the oxidation of ascorbic acid.
Nature, 1959, **184**: 902-3, bibl. 3.

Other trees and shrubs.

(*See also* 73, 214, 550-552, 554-559, 913, 971, 972, 974-976, 1449.)

1064. (OELKER, G.)
Arbusti a frutti decorativi. **(Shrubs with ornamental fruits.)**
Frutticoltura, 1959, **21**: 527-34, illus.

A list of 24 species, with notes on cultivation and propagation.

1065. DE BOER, S., AND VAN DOESBURG, J.
Proeven met winterstek. **(Experiments with winter cuttings.)**
Jaarb. Proefst. Boomkw. Boskoop, 1958, pp. 32-5.

Storage of winter cuttings in bins with electrical soil heating was not generally successful, possibly because the heating period was started and finished too late. Cuttings of *Berberis thunbergii atropurpurea nana*, *Forsythia* "Beatrix Farrand" and *F. intermedia* "Lynwood Gold" rooted well, even without hormone treatment. There was little difference in the rooting of *B. stenophylla* when cuttings were dipped in water (89%) or a growth substance solution (±90%). Higher rooting percentages of *Chaenomeles* "Crimson and Gold" and of *Cotoneaster horizontalis* occurred with untreated cuttings than with cuttings treated with growth substances. The rooting of *Cornus alba elegantissima* and Brompton cuttings was improved by treatment with 50 mg./l. IAA. *Philadelphus* "Virginal" gave the highest percentage of rooting when treated with 50 mg./l. IBA. *Weigela* "Eva Rathke" cuttings rooted equally well without treatment and with 50 mg./l. IBA.

1066. DE VOGEL, P.
Enten van blauwe sparren onder glas. **(Grafting blue spruce under glass.)**
Het enten van beuken onder glas. **(Grafting beech under glass.)**
Het enten van eiken onder glas. **(Grafting oak under glass.)**
Jaarb. Proefst. Boomkw. Boskoop, 1958, pp. 40-2, 43-4, 44-6.

Stocks for blue spruce should be potted before grafting, and the pot should be kept dry for 1 week before grafting. Hard cutting back of the stock before grafting improved the take of Koster blue spruce, but had no effect with Moerheim scions. Grafts should not be stored for longer than 2 days. Grafting was best done in mid-August. Callusing was less satisfactory under single glass than under double glass, and results with a plastic lining were variable. Grafts from mother trees growing in peat gave a slightly higher percentage take than those from mother trees growing in sand.

Three-year-old stocks of *Fagus sylvatica* were used for grafts of *F. sylvatica atropunicea*. Grafts united satisfactorily in a cold frame, and treatment with an organic mercury compound prevented disease. *Quercus robur concordia* grafted on *Q. robur* under double glass in the glasshouse united fairly well; results were less good under double glass in a frame. One-year-old twigs from older trees gave better results than grafts from one-year-old grafted trees, and thick grafts were better than thin.

1067. DE HAAS, P. G.
Über die Kühllagerung von Baumschulgehölzen. **(On the cold storage of nursery stock.)**
Gartenwelt, 1959, **59**: 277-8.

This is a report on work in progress on the cold storage, in spring, of many woody ornamentals awaiting dispatch. To save labour the roots remained uncovered so that a high level of relative humidity had to be maintained. When a single mean storage temperature had to be employed for a variety of plants with different requirements, plants that needed lower temperatures were kept dormant by treatment with growth-inhibiting substances. Detailed results are to be published later.
—Inst. Obstb., Hannover-Sarstedt.

1068. NITSCH, J. P., AND SOMOGYI, L.
Le photopériodisme des plantes ligneuses. **(Photoperiodism in woody plants.)**
Ann. Soc. nat. Hort. France, 1958, **4**: 466-90, bibl. 9, illus.

Plants of 41 species, representing 33 genera, were grown in pots in the greenhouse with day lengths of 10, 14, 18 and 24 hours, the first 8½ hours' illumination being natural daylight and the remainder artificial at approximately 200 lux. A further treatment consisted of 8½ hours' daylight followed immediately by 1½ hours' artificial light, with an additional ½ hour in the middle of the 14-hour night, using for this interruption either white incandescent, or white, red or blue fluorescent light. The effects on growth are noted for each species, followed by a classification into groups according to the photoperiodic conditions necessary to induce dormancy. In the majority of species the 10-hour day had this effect in a very short time, but in *Cercidiphyllum japonicum*, *Rhododendron* spp. and *Taxus cuspidata* activity declined more slowly before ceasing, and species which resisted dormancy included *Buxus sempervirens*, *Ceanothus cyaneus*, *Citrus sinensis*, *Cotoneaster horizontalis*, *Eucalyptus ficifolia*, *Fuchsia boliviana*, *Malus pumila* (which grew faster than with 14-hour days), and *Taxodium distichum*. Species in which 14-hour days were too short to maintain growth included *Acer ginnala*, *Berberis thunbergii* (which showed no growth even with 18-hour days), *Betula papyrifera*, *Cercis canadensis*, *Picea* spp., *Pinus strobus* and *Viburnum opulus*. Interruption of the 14-hour nights prevented dormancy in most instances, but actually retarded growth in *Juniperus communis*. The stimulating effect of the interruption was generally greatest with red, but practically nil with blue, fluorescent light. Vernalized plants of *Abelia grandiflora* produced flower buds in 7 weeks with 24-hour days, in 8 weeks with 18-hour and in 9 weeks with 14-hour days. The 10-hour days inhibited flowering, but their effect was counteracted by all except the blue midnight lighting interruption. Red fluorescence took 11, white fluorescence 13, and white incandescence 18 weeks to effect flowering. [See also *H.A.*, 28: 1081x and 1755.]

1069. (Waxman, S.)
Artificial light found to accelerate growth.
Flor. Exch., 1959, **133**(10): 17.

Brief but frequent exposures to light during the night, amounting in all to 1½ hours, resulted in growth of dogwood [*Cornus* sp.] equal to that following 16 hours of continuous light each night. Shoots of Japanese maple [*Acer palmatum*] grew ½ in. a day with either continuous lighting or with frequent intermittent light periods at night. Responses have also been obtained with *Abelia*, European cranberry bush [*Oxycoccus palustris*], creeping juniper [*Juniperus horizontalis*], red oak [*Quercus rubra*], Chinese dogwood and rhododendrons. The value of increased growth for propagation purposes is discussed.—Univ. Conn., Storrs.

1070. Reid, K. M.
Street lighting and street trees.
Proc. nat. Shade Tree Conf., 1958, pp. 128-41, bibl. 9, illus.

Crown pruning shape and height are discussed in relation to street lamp position. A diagram indicates the lamp mounting height and distance from the kerb required for use with trees of five different crown shapes planted 3 feet from the edge of the pavement.

1071. Thomae, K.
Von der Industriefestigkeit unserer Gehölze. **(On the resistance of our trees and shrubs to industrial smog.)**
Gartenwelt, 1959, **59**: 269-70, illus.

The response of many woody ornamentals to atmospheric pollution recorded.

1072. Schuder, D. L.
Controlling shade tree gall insects.
Amer. Nurserym., 1959, **110**(9): 115-19, bibl. 12, being *Purdue J. Pap.* **1410**.

Symptoms of damage by several species and their control.

1073. Bik, R. A.
Bouvardia. De bestrijding van ijzerchlorose. **(The control of iron chlorosis of bouvardias.)**
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 44.

Leaf chlorosis in a summer crop of bouvardias was attributed to Fe deficiency and was cured by soil applications of 200 ml. 0·5% Chel. 330 Fe per plant.

1074. Foard, D. E.
Pattern and control of sclereid formation in the leaf of *Camellia japonica*.
Nature, 1959, **184**: 1663-4, bibl. 5, illus.

Cell differentiation studies.

1075. Lewis, G. H.
Graft of *Chorisia speciosa* successful.
Lasca Leaves, 1959, **9**: 54, illus.

Scions budded on to seedling stock.

1076. Plumridge, A. J.
Dwarf conifers—a selection.
J. Agric. Vict. 1959, **57**: 391-5, illus.

Dwarf species of *Chamaecyparis*, *Juniperus*, *Taxus* and *Thuja* suitable for Victoria gardens are described.

1077. Trenk, F. B.
Growing and selling Christmas trees.
Circ. Univ. Wis. Ext. Serv. **425**, revised 1959, pp. 8, bibl. 2.

Species used, growing and marketing.

1078. Bell, L. E.
Selecting species of Christmas trees for planting in Michigan.
Ext. Bull. Mich. St. Univ. **E-363**, 1959, pp. 19, bibl. 3, illus.

Large plantings of Christmas trees are being undertaken in Michigan, and the author emphasizes that only high quality trees will be marketable. Pines are easier to establish and grow more readily than spruces or firs, but need more shearing and are more subject to pest damage. Douglas fir and white fir produce some high quality trees, but their disadvantages are that they need long rotations, have irregular growth habits, are susceptible to frost damage and are difficult to transplant.

1079. Janes, R. L., Butcher, J. W., and Morofsky, W. F.
Christmas tree insect control.
Ext. Bull. Mich. St. Univ. **353**, 1958, pp. 42, illus.

Identification and control of numerous pests.

1080. Kuroyanagi, S., and Ishikawa, T.
Spectrochemical studies on mineral translocation and deposition in forest trees. II. Deposition of mineral elements in roots and leaves of sugi *(Cryptomeria japonica* D. Don) grown under different conditions.
[Japanese, with English summary ¾ p.]
Sci. Reps Fac. Agric. Okayama Univ., 1959, No. 13, pp. 47-55, bibl. 11, illus.

The results are given of analyses for Ca, Mg, P, Mn and B in the leaves and roots of seedlings grown in nursery soil, culture solution and municipal water.

1081. Chandler, C.
The propagation of *Larix* from soft-wood cuttings.
Contr. Boyce Thompson Inst., 1959, **20**: 231-8, bibl. 6, illus.

From 1948 to 1956 various experiments were made in an attempt to find a suitable method for rooting soft-wood cuttings of larch. Only occasional rooting took place in a conventional greenhouse bench or in a Wardian case. Sugars and fungicide treatments proved ineffective. Success was attained in 1956, 1957 and 1958 tests by the use of a Watco mist control unit installed in the greenhouse. Sand was used as a rooting medium. Two- to 4-year-old trees furnished the best cutting material, and least rooting was obtained from cuttings from 27- to 30-year-old stock. Treatment with Hormodin 3 aided the rooting of cuttings taken from all trees above 4 years of age. Cuttings taken in August and September proved superior to those taken in May or June. Tip cuttings from terminal shoots rooted more easily than the basal portions. [From author's summary.]

1082. Kröber, H., Sauthoff, W., and Maatsch, R.
Untersuchungen über das "*Erica*-Sterben". **(Studies on "erica death".)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 139-41, bibl. 19, illus.

The symptoms of a case of "erica-death" on *Erica gracilis* are described. The pathogen proved to be *Phytophthora cinnamomi*, and sanitary measures are recommended for its control.

1083. Sarasola, A. A., and de Sarasola, M. A. R.
Enfermedades del eucalipto en la Argentina. **(Diseases of eucalyptus in Argentina.)**
Idia, 1959, No. 139, pp. 1-11, bibl. 57, illus.

Diseases and disorders caused by fungi, frost, drought, soil conditions and viruses are described. Varieties of eucalyptus resistant to frost and drought are listed.

1084. Menninger, E. A.
The cultivated eugenias in American gardens. Part 2.
Nat. hort. Mag., 1959, **38**: 145-63, illus.

Notes on New World species, namely those of *Eugenia*, *Myrceugenia*, *Myrciaria* and *Pimenta* [for part 1, see *H.A.*, 29: 3942v].

1085. Ljubčenko, V. M.
Catalase activity in the seeds of *Tilia cordata* and *Euonymus europaea* during stratification.
[Russian.]
Bot. Žurnal, 1959, **44**: 522-4, bibl. 10.

Changes in catalase activity in the embryo and endosperm of the seeds were studied during different stratification treatments. Activity was highest in those seeds in which the preparation for germination was most effective, i.e., in the case of *Euonymus europaea*, pre-germinated seed stratified at 15° C. for 150 days and then at 0° C. for 90 days.

1086. Ferguson, R. E.
Some new honey locusts.
Amer. Nurserym., 1959, **110**(9): 102-4.

Some selections of *Gleditschia triacanthos*, which are practically thornless and seedless.

1087. Bik, R. A.
Hortensia. Ijzerchelaatbehandeling. **(Hydrangea. Iron chelate treatment.)**
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 73-4.

Iron chelates (0·5% solutions), applied to the soil at 25 ml. per plant, were more successful than foliar applications in correcting chlorosis. Chel 330 Fe and Chel 138 Fe acted rather more quickly than RA 157.

1088. Plaisted, R. L., and Lighty, R. W.
The ornamental hypericums.
Nat. hort. Mag., 1959, **38**: 122-31, illus.

Brief descriptions are given of species, which are grouped according to their overall similarity.

1089. Rycroft, B.
A new species of *Leucospermum*.
J. S. Afr. Bot., 1959, **25**: 247-9, illus.

The botanical characteristics of *Leucospermum arenarium* are described. Seedlings were satisfactorily transplanted from their natural habitat, and cuttings taken from branch tips were successfully established.—Nat. bot. Gdns S. Afr., Kirstenbosch.

1090. FORDHAM, A. J.
Propagation and care of lilacs.
Arnoldia, 1959, **19**: 36-45, illus.

Planting and propagation by cuttings, layers, seed and grafting.

1091. SMITH, D. L.
The effect of juvenility on rooting of cuttings from apple seedlings.
J. Arnold Arbor., 1959, **40**: 172-5, bibl. 4.

Bark inversion induced the development of juvenile shoots from the base of seedling ornamental apple trees. Cuttings taken from these shoots in June rooted much more readily than did cuttings taken from the fruiting branches. Root suckers of a mature ornamental apple tree rooted well, even when they had developed 6–7 ft. from the base of the tree, whereas cuttings taken from the fruiting branches produced no roots even with hormone treatment. A 3-year-old Hopa Crab seedling, which appeared promising as a dwarfing rootstock, rooted readily from cuttings.

1092. MAMELI CALVINO, E.
Palme decorative rustiche: *Brahea* ed *Erythea*. (**Hardy ornamental palms: *Brahea* and *Erythea*.**
Ital. agric., 1959, **96**: 605-8, bibl. 6, illus.

1093. LOTHIAN, T. R. N.
Further notes concerning the Central Australian cabbage palm *Livistona mariae*.
Principes, 1959, **3**: 53-63, illus.

A description of the palm in its natural habitat, particularly with regard to seed germination and seedling development.

1094. PHADNIS, N. A., AND GOPALKRISHNA, N.
A case of bud-variation in *Plumeria rubra* Linn.
Poona agric. Coll. Mag., 1959, **49**: 262-3, bibl. 11.

Flower variants at the Ganeshkind Fruit Experiment Station, Poona, described.

1095. LARSON, R. A., AND LANGHANS, R. W.
Poinsettia progress for '59.
Bull. N.Y. St. Flower Grs, 1959, No. 163, pp. 1-5, illus.

Flowering was delayed in plants grown at a night temperature of 60° F., but there was little difference in flowering between plants grown at 65° F. and at 70° F. Propagation tests indicate that taking cuttings after September 23 is not to be recommended, although a grower has produced saleable plants by Christmas from cuttings taken on October 4. Plants pinched by September 19 and grown at 60° F. (day) and 70° F. (night) with a 9-hour photoperiod were ready for sale at Christmas. At a constant temperature of 70° F. plants pinched by September 30 were also ready for Christmas sale. Low light intensities retarded bud initiation and early development, but the later stages of development were not affected.

1096. VAUTRIN, E.
L'éclairage d'appoint et les poinsettia. (**Supplementary lighting for poinsettias.**)
Ann. Soc. nat. Hort. France, 1959, **5**: 504-5, illus.

Retardation of flowering in poinsettias grown for the New Year trade was most successful when supplementary lighting was used during the 2nd half of September. At a temperature of 16–18° C. an extension of day length to 12 hours for the above period produced the flowering peak on 8 January. With a similar extension confined to the last week of September the marketing stage was reached a few days earlier, whereas it could be delayed until the 2nd or 3rd week of January by prolonging the treatment to 3 weeks.

1097. CATHEY, H. M.
Poinsettia flowering, growth changed by chemicals.
Flor. Exch., 1959, **132**(25): 11, 28-9, bibl. 3, illus.

Carvadan (3-isopropyl-4-dimethylamino-6-methylphenyl-1-piperidine-carboxylate methyl chloride) when applied in various ways to the soil or as a dip or a foliar spray, retarded growth, but not flowering of poinsettias. The extent of the response varied with the variety. It is suggested that Carvadan may be used commercially in the production of dwarf pot plants, and also to counteract the stem lengthening effects of high temperature and light during September and October.—U.S.D.A.

1098. VAŠKULAT, P. N.
Anomalies in the generative organs of *Padus racemosa* Gilib. [Russian.]
Bot. Žurnal, 1959, **44**: 848-50, illus.

In a type of *Prunus padus* with pink flowers, the morphology of which differed somewhat from the normal.

1099. RODIONOV, A. P.
A study of the vernalization stage in *Prunus tomentosa*. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(3): 19-22.

Prunus tomentosa proved able to form flower buds when 1 year old. When seed was vernalized or stratified at 0 to 3° C. for 76 or 84 days, as many as 83% of the seedlings flowered in their second year and 75·6% fruited. Of the seedlings from untreated seed 34·3% flowered when planted out early in a cold spring, but only 3·6% when planting was delayed until the weather was warmer. Lengthy air drying of the treated seed did not vitiate the effect of vernalization.

1100. v.d. Zwaard, P., and Bik, R. A.
Azalea. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1958, pp. 34-7.

Azalea cuttings rooted best in a medium of fresh, mossy, conifer soil mixed with a fourth part of non-resinous sawdust (deal was used in the experiment). Azaleas grew satisfactorily in a coarse peat soil but only with adequate fertilizer dressings; azaleas in conifer soils also reacted favourably to relatively high applications of fertilizers. The application of brewers' grains to the soil before transplanting improved leaf colour during the early stages of growth.

1101. Frisbie, L. F.
A yellow-flowered form of *Rhododendron carolinianum*.
J. Arnold Arbor., 1959, **40**: 156-7.

A new introduction of horticultural value.

1102. Baldsiefen, W.
Deciduous azaleas from cuttings.
Nat. hort. Mag., 1959, **38**: 168-70.

The method of rooting azaleas at Rochelle Park, N.J., is described in detail. Cuttings are taken from the end of May to mid-June, although precise timing is not important. The growing tip is pinched from all cuttings, which are dipped without wounding for about 15 hours in a 75 p.p.m. IBA solution; for yellow flowered azaleas a 50 p.p.m. solution is used. The cuttings are struck in shaded outdoor frames in a 50 : 50 peat moss/sand mixture topped up with ¼ in. of coarse sand. They are transplanted about the beginning of September into boxes containing 2 parts of shredded commercial peat, 1 part sifted or shredded top soil and ½ part Michigan peat moss. The method of overwintering is described. No trouble occurs in starting the cuttings into growth the following spring.

1103. Kiplinger, D. C., and Nelson, K. S.
Temperature affects azalea bud formation.
Ohio Fm Home Res., 1959, **44**: 29.

A 2-year test of the response of the azalea variety Coral Bell to variations in day length and temperature failed to reveal any effect due to day length. Plants grown in warm night temperatures (60–70° F.), however, showed evidence of flower bud formation 5 weeks after pinching, whereas those subjected to 50° F. at night showed no signs of flower buds until the cold treatment was discontinued. [See also *H.A.*, 28: 3993.]

1104. Kiplinger, D. C.
Greenhouse azalea forcing is affected by pinching date.
Ohio Fm Home Res., 1959, **44**: 14.

Experiments over 2 seasons showed that plants pinched on April 1 would flower for Christmas, whereas those pinched on May 1 might not, and those pinched on June 1 would not.

1105. Gerstner, W.
Beobachtungen über das Auftreten der Azaleentriebspitzenmilbe in Torf- und Nadelerdekulturen. **(Observations on the incidence of mites on the tips of azalea shoots in peat and pine needle soil culture.)**
Dtsch. Gartenb., 1959, **6**: 164-5, bibl. 2.

Observations on azaleas growing in peat and/or pine needle soil showed that infestation by tarsonemid mites was lightest in plants growing in peat alone. This is attributed to the less frequent watering needed, which results in a less favourable humidity for mite development.—Inst. Gartenb., Dresden-Pillnitz.

1106. Pape, H.
Der Heidewurzelspinner als Azaleenschädling. ***(Hepialus hecta*** **as a pest of azaleas.)**
Gartenwelt, 1959, **59**: 271-2, bibl. 3, illus.

A description of the pest and the injury it causes, with suggestions on insecticides.

1107. Wyman, D.
Viburnums valued for varied species useful in gardens.
Amer. Nurserym., 1959, **110**(5): 14-15, 61-71, illus.

With short descriptions of many useful species.

SUB-TROPICAL FRUIT AND PLANTATION CROPS

Avocadoes.

(*See also* 445, 563, 1152.)

1108. Hodgson, R. W.
The avocado industry of Chile.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 45-9, bibl. 3.

Notes on geography and economics, environment, varieties, cultural practices, harvesting, marketing and problems.

1109. Storey, W. B.
Avocado variety trials at Riverside and Greenspot.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 87-90, bibl. 2.

Brief descriptions are given of 32 varieties in the Riverside collection, and a further 10 still too young for evaluation are mentioned. At Greenspot 18 varieties were selected for trial in 1956.

1110. MOREAU, B., AND COMELLI, A.
Observations sur le comportement de l'avocatier en Guinée. **(Observations on the behaviour of avocadoes in Guinea.)**
Fruits d'Outre Mer, 1959, **14**: 341-6, illus.

The French Overseas Institute for Fruit Research at Foulaya, French Guinea, recommends 8 out of 30 varieties of avocado introduced from various sources. Descriptions and photographs are given of Hall, Gottfried, Peterson and Pollock.

1111. EMBLETON, T. W., JONES, W. W., AND GARBER, M. J.
Leaf analysis as a guide to nitrogen fertilization of avocado.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 94-5, bibl. 3.

From the curve of yield as related to N, expressed as a percentage of leaf dry weight, the most productive range of N% was found to be 1·6–2·0 for the variety Fuerte. The range for MacArthur was similar, whereas that for Hass was somewhat higher. An annual application of 100–150 lb. of N per acre should enable the trees to attain this range. [For an earlier report see *H.A.*, 29: 1779.]—Univ. Calif., Riverside.

1112. LABANAUSKAS, C. K., EMBLETON, T. W., AND JONES, W. W.
Fertilizer effects upon micronutrient nutrition of the avocado.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 96-9, bibl. 7.

Further confirmation of results reported in *H.A.*, 29: 781.

1113. TRASK, E. E.
Avocado irrigation.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 51-3, bibl. 5.

Notes on the installation and use of the low or under-tree sprinkler system.

1114. SCHROEDER, C. A., BRIGGS, J., AND KAY, E.
Fruit graft in avocado.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 108-9, bibl. 2, illus.

Two Hass avocado fruits about 3½ in. long were approach-grafted while still hanging on the tree. The two longitudinal cut surfaces were held together firmly by rubber bands. A union between the tissues of the two fruits occurred within 6 weeks. This success in grafting two nearly-mature fruits is ascribed to the fact that in the avocado fruit, unlike most other fruits, cell division continues up to the time of maturity.—Univ. Calif., Los Angeles.

1115. SCHROEDER, C. A.
Morphological aspects of the so-called woody avocado.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 100-3, bibl. 4, illus.

The production of malformed "woody avocado" fruits was found to be due to abnormal development of the stamens and, more rarely, the pistils. The cause is unknown.—Univ. Calif., Los Angeles.

1116. CHRISTIE, A. W.
Nursery tree certification insurance against root-rot.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 73-4.

A 5 point programme for producing avocado trees free from root rot (*Phytophthora cinnamomi*) includes hot-water treatment of the seed (120° F. for 30 min.), growing seedlings in containers in methyl bromide-fumigated or steam-sterilized soil, and periodic inspection.

1117. THORN, W. A., ZENTMYER, G. A., AND WONG, P.-P.
Irrigation water tests to isolate the avocado root rot fungus.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 104-6.

Experiments under conditions favourable for the spread of *Phytophthora cinnamomi* failed to establish the presence of this fungus in irrigation and drainage waters. [For other *Phytophthora* spp. see abstract 1162.]—Univ. Calif., Riverside.

1118. SHER, S. A.
Nematodes in avocados.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 91-3, illus.

Avocadoes planted in an old walnut soil infested with root-lesion nematodes (*Pratylenchus vulnus*) grew twice as fast in the first 2 years where the soil had been fumigated with 120 gal./acre D-D before planting than in untreated soil. No root-lesion nematodes were recovered from around the vigorously growing trees in fumigated soil, whereas all the tree sites in the untreated soil were infested. Greenhouse tests have confirmed the pathogenicity of this nematode to the avocado.—Univ. Calif., Riverside.

1119. EBELING, W., FLESCHNER, C. A., AND RICKER, D. W.
Some factors which influence pest population on avocados.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 79-82.

Geographical location: The majority of avocado pests are either confined to the coastal areas of California or are more abundant there, though some sporadic outbreaks may occur inland. *Seasonal climatic conditions:* Mild winters favour the overwintering of greenhouse thrips. A spray of 2 lb. of 25% malathion w.p. plus 1 lb. of 50% Ovotran (for mites) gave effective control with a minimum of harm to natural enemies. *Planting distance:* In old orchards of Fuerte, which has a spreading habit, the removal of alternate trees may reduce severe infestations of avocado worms and greenhouse thrips. *Variety:* The susceptibility of several varieties to different pests is indicated. *Nearness to favoured hosts:* Host plants which may be the source of infestation are listed. *Natural enemies:* Parasites and predators abound on avocadoes, but the former are adversely affected by road dust [see *H.A.*, 29: 1783]. DDT, TDE and basic lead arsenate sprays have resulted in increased populations of six-spotted mite and latania scale.—Univ. Calif., Riverside.

1120. PIERCE, H. F.
The nutritional value of the avocado.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 83-5.

The avocado has a low carbohydrate content but a high calorific value. Its oil contains one of the most valuable of the unsaturated fatty acids that are now known to be anticholesterol agents. Vitamins A, B, C, D, E and K and a very high content of iron have been found in avocado pears. Another desirable feature is the absence of poisonous deposits, as the crop needs little or no spraying.

Citrus—general.

1121. CHAPMAN, H. D.
The cultivation of citrus.
World Crops, 1959, **11**: 173-6, 217-19, 251-4, illus.

The management of citrus lands: The deterioration of orchard soils under tillage and the spread of non-cultivation methods are described. Weed control by CMU at 2 lb. per acre is recommended for older orchards. No organic matter need be added to fertile soil, provided that soil permeability, aeration and moisture are maintained. As there is no existing fumigant which does not injure tree roots, fumigation should only be practised when replanting. *Irrigation and drainage:* Details are given of basin, furrow and sprinkler irrigation, and quantities and frequency of application are discussed. Drainage to ensure soil aeration is necessary in many soils, and mound planting may be advisable in areas of heavy rainfall. *The fertilization of citrus soils:* Nutrient deficiencies are described. Corrective measures for lack of N, P, K, Mg, Zn, Mn, Cu, Fe, B, S, and Ca are given. Methods are also described for reducing excesses of B, S, Cl, Na and Li.

1122. NANKIVELL, W. I.
Lemon growing in Victoria.
J. Agric. Vict., 1959, **57**: 285-9, 328-39, illus.

Lisbon and Eureka are the main varieties grown, and the normal rootstocks are rough lemon and sweet and sour orange, although *Poncirus trifoliata*, common lemon and *C. reticulata* are also used. Details are given of suitable soils, sites and methods of planting, the importance of good drainage being stressed. Cultivation, manuring, irrigation, harvesting and packing are also described.

1123. U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
World citrus production continues to rise.
Foreign Agric. Circ. U.S. Dep. Agric. **FCF 3-59**, 1959, pp. 4.

Production figures for 1958 were: oranges 377·2 m., grapefruit 49·1 m., lemons 39·4 m. boxes.

1124. FAO.
The citrus situation.
[*Pap.*] *FAO* **CCP 58/15**, 1958, pp. 14 + tables.

A review of world production, trade and current marketing problems.

Citrus—varieties and propagation.

(*See also* 1470.)

1125. TANAKA, T.
Origin of citrus fruits with reference to the Himalaya region. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1959, **28**: 71-5, bibl. 21.

Possible evolution of citrus species in Eastern Asia.

1126. REECE, P. C.
Problems and progress in breeding citrus in Florida.
J. Rio Grande Valley hort. Soc., 1959, **13**: 18-21, bibl. 3.

Mentions 3 Clementine tangerine × Orlando tangelo hybrids outstanding for earliness.

1127. MAJSURADZE, N. I.
Intervarietal hybrids and nucellar seedlings in orange. [Russian.]
Agrobiologija, 1959, No. 2, pp. 188-92, illus.

The quality and productivity of nucellar orange seedlings are stated to be higher than those of the parent varieties. To obtain nucellar seedlings female-polyembryonic, high-quality varieties should be crossed with frost resistant varieties, so that the pollen of the latter can have a favourable influence on the nucellar embryo. Budding nucellar seedlings on *Poncirus trifoliata* also increased their frost resistance.

1128. MARLOTH, R. H., AND BASSON, W. J.
Relative performance of Washington Navel orange selections and other navel varieties.
J. hort. Sci., 1959, **34**: 133-41, bibl. 5, illus.

Results are reported of studies on the growth, yield and quality of 3 selected navel varieties and 4 Washington Navel strains in 2 localities over periods of 8 and 12 years. In the nursery budlings of Robertson and Pickstone Navels were smaller than the others. At 17 years old the Robertson trees were the smallest, and Company and Pretoria trees the largest; the 4 strains of Washington Navel, which included Pickstone, did not differ in size. The smaller Robertson Navel trees yielded less than the other selections; there were no differences in yield between the 4 strains of Washington Navel. Robertson bore the smallest fruit, and the other 2 navel varieties had smaller fruit than the 4 Washington Navels, which did not differ in size. Company and Pretoria Navels had thinner rinds, higher juice contents, less total soluble solids (T.S.S.) and more acid than the other selections. Robertson Navel had a thinner rind, sometimes more juice and consistently higher T.S.S. than the 4 Washington strains. Robertson Navel matured early and Company and Pretoria Navels late. The presence of occasional seeds in the fruits was established as a characteristic of some navel varieties and strains. As the trees grew older there was a decrease in fruit size and rind thickness and an increase in the T.S.S. content of the juice. There were differences between the 2 localities as regards tree size and fruit yield and quality.—Citrus and subtrop. hort. Res. Stat., Nelspruit.

1129. Rao, S. N., and Rao, P. B.
Bud variation in sweet orange *Citrus sinensis* Osbeck.
Sci. and Cult., 1959, **25**: 269-70, bibl. 5, illus.

Certain budded Sathgudi trees produced abnormally upright shoots with variant leaves, and the fruit on these trees was very large with coarse rinds and low contents of poor-quality juice.—Fruit Res. Stat., Kodur.

1130. Šeftel’, I. M.
The Chinese lemon in the arid sub-tropics of Central Asia. [Russian.]
Priroda, 1959, **48**(9): 109-11, illus.

The Meyer lemon recommended for growing in the open or in trenches.

1131. Johnston, J. C., Opitz, K. W., and Frolich, E. F.
Citrus propagation.
Circ. Calif. agric. Exp. Stat. **475**, 1959, pp. 22, illus.

Practical advice on propagation from seed and cuttings, nursery management and top-working.

1132. Bacchi, O.
Estudos sôbre a conservação de sementes. II. Citros. (**Seed storage studies. II. Citrus.**) [English summary ¼ p.]
Bragantia, 1958, **17**: 157-66, bibl. 4, illus.

Seeds of Rangpur lime and sweet orange, the two chief rootstock species of São Paulo State, stored best in closed containers at 2–3° C. in a very humid atmosphere. The former retained their viability for 14 months at 33–38% humidity and the latter for 11 months at 41–50%.

Citrus—planting, soil management and environment.

(*See also* 335, 1121, 1146.)

1133. Lavrijčuk, I. I.
Group planting of citrus. [Russian.]
Agrobiologija, 1959, No. 1, pp. 143-6, illus.

Methods of growing citrus in the northern subtropical areas of the U.S.S.R. (parts of the Krasnodar province and Georgia) were studied. On level or slightly sloping land the best results were obtained when 3 orange or mandarin trees were planted in holes 1 m. wide with the centres of the groups spaced 4 × 4 m. apart for cross-block cultivation. The trees were neither shaped nor pruned, only dry or damaged branches being cut out. During the first 2 winters they were completely covered and thereafter earthed up to 40–50 cm. to protect the stems and lower parts of the main branches. On slopes of more than 10° planting 1 m. apart in rows 4 m. apart, again without pruning and using the above method of covering, was the most satisfactory system.

1134. Ľvin, N. S.
Results of work on the trench cultivation of citrus in Moldavia (1950-1955). [Russian, with Moldavian and English summaries.]
Izv. Mold. Fil. AN SSR, 1957, No. 2–3, pp. 85-96, from *Ref. Ž.* (*Biol.*), 1958, No. 14, Abstr. 63,553.

The method of growing lemons in trenches has been developed in Moldavia, where frosts of —32° C. occur and the vegetative period with temperatures suitable for growth is in the region of 185 days instead of the requisite 200. The best protection for the trenches was found to be a 20-cm. layer of sawdust covered with roofing paper over planks. The soil was heated with warm air passed through earthenware pipes. Mulching the trench soil with grape pomace moderated temperature extremes and humidity. During the summer the trenches were shaded between 11 a.m. and 5 p.m. The inter-trench strips were sown with legume-grain mixtures. The best method of irrigation was by sprinkler inside a 3-sided reed or brush screen. For optimum nutrition 80 g. PK per tree mixed with organics was applied.

1135. Lawrence, F. P.
Managing and care of young citrus trees.
Citrus Ind., 1959, **40**(9): 3-4, 9-10.

A review of practices recommended in Florida.

1136. Hilgeman, R. H.
Response of Marsh grapefruit to different methods of soil tillage in the Salt River Valley of Arizona.
J. Rio Grande Valley hort. Soc., 1959, **13**: 9-17, bibl. 6.

Since 1949 trees planted in 1931 have been given 4 different soil treatments: no tillage with oil spray weed control; a cover crop disced 4 times a year; a cover crop disced twice a year and mowed in between; and a permanent bermuda grass sod mowed 8 times a year. The only appreciable differences obtained in 9 years were due to the bermuda grass, which reduced yields, increased phosphorus uptake, retarded tree growth and lowered fruit acidity.—Univ. Ariz. Citrus Exp. Stat., Tempe.

1137. Gerard, C. J., Bloodworth, M. E., and Cowley, W. R.
Effect of grasses and mulches on soil moisture losses and soil temperature changes in the lower Rio Grande Valley of Texas.
J. Rio Grande Valley hort. Soc., 1959, **13**: 97-101, bibl. 3.

Over 4 years a grass cover required 20% more moisture than a soil mulch and 30% more than a straw mulch. The annual variations in the average monthly temperature at 3 inches below the soil surface were 30·4° F. with soil mulch, 24·7° F. with straw mulch and 19·5° F. under grass.—Tex. agric Exp. Stat., Weslaco.

1138. Leyden, R. F.
Relation of cultural practices to soil moisture depletion in a young citrus orchard.
J. Rio Grande Valley hort. Soc., 1959, **13**: 102-7, bibl. 3.

The methods compared were: no cultivation with cover crop; no cultivation with a mulch of cotton gin trash; no cultivation with chemical weed control; and weeds disced under 6–8 times a year. The cover-crop plot retained the most soil moisture in the irrigation period of May to September, and it also used the most water, as it had the highest water infiltration rate resulting from its better physical condition. The plot with chemical weed control used and retained the least water, owing to sealing of the soil surface. The disced plot had almost the same water demand as the cover-crop plot, but not its retention capacity; water infiltration was impeded by the plough pan.—Tex. agric. Exp. Stat., Weslaco.

1139. Prevatt, R. W.
Tolerances of certain citrus seedlings to free water in soil.
Diss. Abstr., 1959, **20**: 841-2, being *L.C. Card No. Mic.* 59-3553 of 159 pp.

Seedlings of rough lemon, sour orange, sweet orange and Cleopatra mandarin flooded in a sandy soil for 12 months starting in January, when the plants were still dormant, showed no visible symptoms of injury. Seedlings flooded in April, after they had started growth, showed leaf symptoms of water injury after 5 weeks, and those flooded in June, July or August showed injury symptoms within 2 weeks. All seedlings growing in subsoil showed water injury symptoms sooner than seedlings growing in topsoil when flooded during the summer months. The addition of dolomite limestone enabled the seedlings growing in the subsoil to be more tolerant of free water. Carrizo citrange, Troyer citrange, sour orange and rough lemon seedlings were more tolerant of free water in both limed and unlimed soil than were sweet orange, Cleopatra mandarin and Rusk citrange seedlings. The water in which citrus roots were incubated and the water extracted from the water-logged soil in metal cans, in which there were citrus roots, contained toxic substances that caused all varieties of citrus seedlings to wilt and become desiccated. These toxic substances were more detrimental to citrus seedlings in an acid aqueous medium than in a basic aqueous medium. —Univ. Fla.

1140. Miwa, T., Gomi, K., and Yamamoto, S.
Studies on briny wind injuries to fruit trees. I. Spray injury caused by sea water to citrus leaves. [Japanese, with English summary.]
Bull. Fac. Agric. Univ. Miyazaki, 1957, **2**: 96-105, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 38,787.

Defoliation in susceptible species began 2 days, and in resistant species 5 days, after exposure to salt water. In both instances defoliation ended about 10 days after exposure. A solution of 50–100 p.p.m. of 2,4-D prevented defoliation [see also *H.A.*, 28: 774].

Citrus—growth and pruning.

1141. Siddiqui, S. H.
Effect of gibberellic acid on cambial activity of young overwintering grapefruit trees.
J. Rio Grande Valley hort. Soc., 1959, **13**: 108-11, bibl. 5.

Applied at a concentration of 100 p.p.m. on November 18 or December 2 GA ended bud dormancy and increased cambial activity. The earlier treatment acted more slowly than the later. Most of the increase in cambial activity took place after bud-break.—Tex. A and M Coll.

1142. Baldini, E., and Canu, S.
Ulteriori indagini sul sistema radicale degli agrumi. (**Further investigations on citrus root systems.**) [English summary 12 lines.]
Riv. Ortoflorofruttic. ital., 1959, **43**: 233-54, bibl. 10, illus.

Investigations on sour oranges in Sardinia have shown that, when the tap root is cut short in transplanting, secondary roots arise near its end and grow down vertically, ultimately reaching a depth of 100–150 cm. The root systems of adult trees, however, consist mainly of roots which grow horizontally between 10 and 90 cm. below the surface and extend to 3–4 times the radius of the crown. It is recommended that sour oranges should be planted at a density of 280–300 trees per ha., and that, because of their spreading root systems, they should not be interplanted with peaches. Several diagrams showing the distributions of root systems are presented.

1143. Lyon, A. V.
Pruning.
Citrus News, 1959, **35**: 43.

Growers in Australia still prefer limited hand- to machine-pruning.

1144. Jutras, P. J., and Krezdorn, A. H.
Guide to the selection of air compressors and electric generators to operate power pruning tools.
Citrus Ind., 1959, **40**(10): 18, 25-6.

As used in Florida citrus groves.

1145. Sleeth, B.
Pruning wound paint for citrus.
J. Rio Grande Valley hort. Soc., 1959, **13**: 70-4, bibl. 4, illus.

Having found 5 asphalt paints to be effective in the prevention of drying out and decay of pruning wounds, a modified formulation consisting of 11 lb. good grade asphalt, 1 gal. high grade kerosene, 1 quart mineral naphtha (mineral spirits) and ½ pt. penta (40% pentachlorophenol) is recommended.—Tex. agric. Exp. Stat., Weslaco.

Citrus—nutrition.

(*See also* 1157, 1183.)

1146. Fletcher, W. A.
Citrus orchard nutrition and soil management.
N.Z. J. Agric., 1959, **98**: 565-72, illus., and **99**: 73-81, illus.

In New Zealand ammonium sulphate is recommended for the supply of N, superphosphates for P and muriate of potash for K. Calcium deficiency is not known. Magnesium deficiency has been found in all areas, dolomite and magnesite being available for acid soils and serpentine, kieserite and epsom salts for the others. No S deficiencies have been recorded. The symptoms and treatments for Fe, Cu, B, Mo, Mn and Zn deficiencies are described, but only the last two are found in New Zealand. Details of a number of proprietary mixed fertilizers are given and the supplements needed to correct the acidity of one and the lack of N in another are mentioned. Such mixtures should be applied in 2 dressings, two-thirds in August [early spring] and the balance in February. For new orchards 1½–2 tons of limestone per acre are recommended, with a further 1½ cwt. for every 1 cwt. of sulphate of ammonia used subsequently. The most widely used cover crops are blue lupins, Algerian oats and mustard. Grassing down is increasing, but the response has been variable. Equal parts of perennial rye grass, short rotation rye grass and white clover have proved a suitable seeds mixture in cases where grassing down has been beneficial. Mulching is also practised. Intercropping is not recommended after the first five years.—Dep. Agric., Auckland.

1147. Kuraoka, T., Matsumoto, K., and Kikuchi, T.
Effect of differential supplies of nitrogen, phosphorus and potassium and medium pH on growth of young Satsuma orange trees in sand culture. [Japanese summary 8 lines.]
Mem. Ehime Univ. Sect. VI, 1959, **4**: 103-13, bibl. 6, illus.

High N (160 p.p.m. in culture solution) at pH 6·5 and 5·0 and low P (10 p.p.m.) at pH 6·5 depressed growth. Leaves of high N trees were low in P and Ca. High P caused increased branching and leaf growth and consequently a high top-root ratio. In general, fibrous root growth was related to the growth of the aerial parts. Potassium had no clear effect on growth. Growth was generally better at pH 5·0 than at pH 6·5.

1148. Embleton, T. W., and others.
Effects of N on Valencia production.
Calif. Citrogr., 1959, **45**: 22-4, bibl. 4.

In a mature orchard, planted on a deep fertile soil, trees which received no N from the spring of 1953 to the spring of 1958 showed no differences in yield, fruit quality or leaf-N composition, when compared with trees receiving an annual application of ½–1¼ lb. N.

1149. Ullah, M. H.
Practical hints on manuring of fruit trees.
Punjab Fruit J., 1958/1959, **22**(78): 11-14.

N fertilization of citrus, mangoes, deciduous and other tree fruits in Pakistan.

1150. Spencer, W. F.
Phosphorus and the growth of citrus tree feeder roots.
Citrus Mag., 1959, **22**(2): 18-19, 30-1, bibl. 8.

The reported depressing effect of superphosphate on the growth of citrus roots was investigated. In a trial with grapefruit root growth still showed signs of depression 17 months after the suspension of superphosphate applications. In a N source trial root growth in the top 18 in. of soil was considerably less with ammoniated superphosphate than with ammonium sulphate or sodium nitrate. No phosphate toxicity was observed with applications of chemically pure monocalcium phosphate, even at high rates of application and although the P contents of the roots were higher than those of grapefruit trees which showed signs of toxicity. Aluminium, applied with or without phosphate, did not induce toxicity. When insoluble calcium fluoride was applied in pot experiments with monocalcium phosphate, root growth was depressed; more soluble F salts did not have this effect.

Other pot experiments showed that seedlings could be damaged by phosphate materials owing to the salt effect of high rates of application. From these results it appears that neither P nor superphosphate in themselves are toxic, but that the acid character of the latter and the presence of potentially toxic minor elements such as fluorides may contribute to root damage.—Fla Citrus Exp. Stat., Lake Alfred.

1151. EMBLETON, T. W., AND JONES, W. W.
Magnesium nitrate. Leaf analyses showed foliage sprays corrected deficiency in Valencia oranges.
Calif. Agric., 1959, **13**(11): 4-5, illus.
See *H.A.*, 29: 2840.

1152. HUFFAKER, R. C., AND WALLACE, A.
Effect of potassium and sodium levels on sodium distribution in some plant species.
Soil Sci., 1959, **88**: 80-2, bibl. 7.
Young plants of rough lemon (*Citrus jambhiri*) and avocado were placed in solutions combining high and low levels of Na (including Na^{22}) with high, medium and low levels of K. In both species the exclusion of Na was more pronounced in the shoots than in the roots, and its accumulation was considerably greater in the feeder roots than elsewhere in the plant. Increasing K decreased Na absorption by the lemon, and promoted the translocation of Na in both species. Values for shoot Na were consistently higher in the lemon than in the avocado (very markedly so in the leaves). The lemon also showed the higher root Na values at the low K level, but with medium and high K the roots of the avocado contained more Na than those of the lemon.—Univ. Calif., Los Angeles.

1153. COOPER, W. C., AND PEYNADO, A.
Chloride and boron tolerance of young-line citrus trees on various rootstocks.
J. Rio Grande Valley hort. Soc., 1959, **13**: 89-96, bibl. 10.
Salt treatments decreased growth in both young- and old-line trees, the decrease being of the same order in both and proportionate to the concentration of salt in the irrigation water. Cleopatra, Timkat and Sunki mandarin rootstocks excluded chloride but accumulated boron, the citranges accepted both, and *C. macrophylla* excluded boron but accumulated chloride. No rootstocks excluded both.—U.S. Dep. Agric. and Tex. agric. Exp. Stat., Weslaco.

1154. COOPER, W. C., AND PEYNADO, A.
Experimental control in citrus trees of iron chlorosis associated with the virus disease cachexia and high soil salinity by applications of iron chelate.
J. Rio Grande Valley hort. Soc., 1959, **13**: 75-80, bibl. 8, illus.

ANON.
Chlorosis from virus and salt can be curbed.
Agric. Res. Wash., 1959, **8**(3): 11, illus.
Soil applications of 1 lb. of Sequestrine 138-Fe to 12-year-old Red Blush grapefruit trees on various rootstocks, all showing severe iron deficiency chlorosis caused by virus, salt injury and calcareous soil, cleared the symptoms for at least 10 months, the period of observation. In sour orange seedlings, however, salt-induced chlorosis was only partially corrected by Sequestrine 138-Fe. —U.S. Dep. Agric. and Tex. agric. Exp. Stat., Weslaco.

1155. BOTELLA SOTO, C., ROYO IRANZO, J., AND PRIMO YUFERA, E.
Diagnóstico foliar. I. Relación entre ciertos caracteres anómalos observados en algunas zonas de cultivo del naranjo y el contenido en oligoelementos de las hojas. **(Leaf analysis. I. Relationship between the abnormalities observed in orange crops in some districts and the trace-element content of the leaves.)**
Bol. Inst. nac. Invest. agron. Madrid, 1959, **19**: 51-66, bibl. 23, illus.
Certain leaf and fruit abnormalities observed in 11 orange plantations in southern Valencia were correlated with unduly high or low leaf contents of B, Zn, Cu and Fe. For example, in 3 plantations with fruit rind abnormalities leaf Cu was high in all cases and leaf Zn was low in one case. The high Cu contents were considered to be due to spraying with Cu products. The leaf symptoms are illustrated by colour photographs.

1156. DIKSHIT, N. N.
Reduction in the intensity of chlorosis on mandarin plants *(Citrus reticulata* Swingle).
Curr. Sci., 1959, **28**: 207-8, bibl. 7.
In 10-year-old mandarin trees suffering from severe symptoms of Zn deficiency the average intensity of chlorosis was reduced over 2 years from 64·6% to 29·2% by spraying the trees with a mixture of the fungicides Triscabol and Trifungol, which contain Zn and Fe diethyldithiocarbamates [see also *H.A.*, 29: 799].—Citrus Die-back Scheme, Gonikoppal, Coorg.

Citrus—diseases and pests.

(*See also* 335, 445, 1185, 1186.)

1157. CARPENTER, J. B., AND OTHERS.
Collapse of young citrus trees in Coachella Valley.
Calif. Citrogr., 1959, **45**: 4, 19-21, bibl. 3.
The following 3 factors were common to orchards which suffered heavy losses from a collapse of unknown origin: almost all of the collapsed trees were on rough lemon rootstock; organic N fertilizers were used abundantly; all plantings received

ample amounts of water. Preliminary experiments showed that dry sewage sludge given at planting severely damaged young rough lemon seedlings and that the damage increased with temperature.

1158. Cooper, W. C., Olson, E. O., and Shull, A. V.
Yellow-vein chlorosis of old-line and young-line red grapefruit trees on various rootstocks.
J. Rio Grande Valley hort. Soc., 1959, **13**: 81-8, bibl. 6.

Counts of incidence and estimates of severity were made of yellow-vein chlorosis, midrib necrosis and iron- and zinc-deficiency chloroses in 3 orchards containing red grapefruit on 18 different rootstocks. The tolerances of these rootstocks to the 3 disorders are tabulated as good, moderate or poor. There was a tendency for virus infected trees to be more susceptible to yellow-vein chlorosis, and the disease was most severe where a high-water table was combined with virus attack. The cause of the yellow-vein chlorosis is considered to be a weak root system occasioned by virus attack on a sensitive rootstock.—U.S. Dep. Agric. and Tex. agric. Exp. Stat., Weslaco.

1159. Olson, E. O., Cooper, W. C., and Shull, A. V.
Virus-free seedling-line and old-line selections of citrus varieties in Texas.
J. Rio Grande Valley hort. Soc., 1959, **13**: 22-6, bibl. 4.

List of 7 grapefruit, 6 lemon, 4 mandarin, 11 sweet orange and 5 tangelo lines apparently virus-free.

1160. Fochessatti, A. P.
Black spot control: protection afforded by spray programme.
Citrus Gr, 1959, No. 309, pp. 7-9, illus.

In the 6 weeks following petal fall the surface area of the Valencia orange increases 16 times, and in the following 6 weeks it increases four-fold. These observations suggest that 3 copper sprays applied at intervals of 6 weeks give insufficient protection, and that they should be applied with an interval of 3 weeks between the first and second applications, then a 4-week interval and finally a 5-week interval. The first application should not be made before full petal fall.—Kynoch Ltd, Nelspruit.

1161. Tamayo, B. P., and Pordesino, A. N.
Occurrence of powdery mildew of citrus in the Philippines.
Philipp. Agric., 1959, **43**: 236-9, bibl. 4, illus.

On *C. nobilis* and identified as *Oidium tingitanium*; bordeaux, sulphur dust or lime-sulphur are recommended for control.

1162. Klotz, L. J., Wong, P.-P., and DeWolfe, T. A.
Citrus irrigation water survey.
Calif. Agric., 1959, **13**(11): 3, 16, illus.

Traps in 12 irrigation canals most commonly collected *Phytophthora citrophthora*, and *P. parasitica* and *P. syringae* were collected less frequently. Chemicals added to the irrigation water to control moss and algae did not affect the occurrence of *Phytophthora*, but, after monthly applications of copper sulphate to a reservoir infected with *P. parasitica*, no *Phytophthora* spp. were recovered. The dangers of infected irrigation water in the spread of disease are emphasized. [For *P. cinnamomi* see abstract 1117.]—Univ. Calif., Riverside.

1163. Baines, R. C., and others.
Controlling citrus nematode and *Phytophthora* fungi.
Calif. Citrogr., 1959, **44**: 380-2.

Mylone 50 D was spread on the soil surface and about 6 in. of water were applied by sprinklers. In the first foot of soil 99·7% of the citrus nematodes [*Tylenchus semipenetrans*] were killed, but mortality of those in the 2nd and 3rd feet was low. No *Phytophthora* species were isolated from the top 2 feet. Further tests showed that, in Mylone-treated soil, basin irrigation in metal rims set in the soil gave a higher nematode kill than did sprinkler irrigation. There was no indication that an overnight delay between Mylone-treatment and irrigation reduced its effect. Suggestions for applying Mylone in sprinkler irrigation water are given. [For preliminary small-scale trials, see *H.A.*, 28: 4022.]—Univ. Calif., Riverside.

1164. van Weerdt, L. G.
Studies on the biology of *Radopholus similis* (Cobb, 1893) Thorne, 1949.
Diss. Abstr., 1959, **20**: 9, being *L.C. Card No. Mic.* 59-1732 of 149 pp.

In biological studies of *Radopholus*, extracts from swedes were tested for nematode control *in vivo*. Severe phytotoxicity on citrus rendered these crude compounds impractical for the control of spreading decline.—Univ. Fla.

1165. Flanders, S. E., and Fisher, T. W.
The economic effect of aphidophagous insects on citrus in South China.
J. econ. Ent., 1959, **52**: 536-7, bibl. 4.

Low aphid infestation due to heavy parasitism, chiefly by *Aphelinus* spp.

1166. Elmer, H. S., and Shilling, W. E.
Weevil found on citrus in central California.
Calif. Citrogr., 1959, **44**: 387-8, bibl. 5.

Brachyrhinus cribicollis has been found in a single citrus grove in California. It may be controlled by a natural cryolite spray, or by chlordane, dieldrin or toxaphene.—Univ. Calif., Riverside.

1167. Smirnoff, W. A.
Sur un nouveau parasite du citrus au Maroc, *Meligethes varicollis* Wollaston, Coleoptera, Nitidulidae. **(A new parasite of citrus in Morocco, *Meligethes varicollis*.)**
Fruits et Prim., 1959, **29**(301): 22-4, bibl. 3, illus.

An invasion of citrus flowers and young fruits by these beetles was tentatively attributed to recent large-scale destruction of their natural enemies by organic insecticides. Dusting the flowers with 3% parathion killed large numbers of the beetles.

1168. YOSHIDA, M., KUBOTA, Y., AND SUZUKI, Y.
Studies on breeding and control methods of citrus ground mealy bug, *Rhizoecus kondonis* Kuwana. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 76-80, bibl. 9.

The mortality of *Rhizoecus* increased as the water content of its breeding medium increased. Orchard populations of the mealy bug were much lower under a straw mulch than in non-mulched soils, and both calcium cyanamide and tobacco dust gave good control. The recommended control measures are initial insecticidal treatment followed by straw mulching.

1169. DEAN, H. A.
Control of *Eutetranychus banksi* McG. on citrus with dusts during 1957, with residue analysis.
J. Rio Grande Valley hort. Soc., 1959, **13**: 59-62, bibl. 2.

The mite population was kept at a low level by sulphur, 3% chlorobenzilate-sulphur and 3% Aramite-sulphur dusts applied on June 8 and September 20. Increases noted in the following 2 months are attributed to weather conditions favouring mite development and inimical to miticidal effectiveness. Analysis showed only 0·56 p.p.m. of chlorobenzilate in the peel and none in the flesh on December 13.—Tex. agric. Exp. Stat., Weslaco.

1170. SMIRNOFF, W. A.
Une nouvelle espèce d'acarien, *Lorryia* sp. (Tydeidae Kramer), vivant sur citrus au Maroc. **(A new species of mite, *Lorryia* sp., living on citrus in Morocco.)**
Fruits et Prim., 1959, **29**(301): 25-7, illus.

Although normally living on secretions from *Saissetia oleae*, this mite becomes parasitic on the fruits of citrus when they begin to develop. It is most common where thiophosphoric esters have been sprayed, and it is not attacked by the predators of other citrus mites. The most effective control measure is dusting with a sulphur-chalk or sulphur-talc mixture in spring. In the hot season this is injurious to the leaves and should be replaced by spraying with Aramite at 60 c.c. per 100 l. of water, adding 1·5–2% white oil if *Saissetia oleae* is abundant.

1171. DEAN, H. A., AND SLEETH, B.
Control of fruit russeting in citrus.
J. Rio Grande Valley hort. Soc., 1959, **13**: 63-9, bibl. 5.

Zineb at 1 lb. per 100 gal. of spray gave the longest residual control of rust mites (*Phyllocoptruta oleivora*), while Tedion at 1 lb. 25% w.p. and Kelthane at 1 quart e.c. and oil at 1⅘ gal. per 100 gal. gave similar results with *Eutetranychus banksi.* Kelthane also showed promise against *Brevipalpus* spp. Timely applications of zineb or sulphur reduced russeted fruit from 80 to 4–18%.

1172. JENKINS, C. F. H.
The citrus red scale.
J. Agric. W. Aust., 1959, **8**: 171-7, illus.

Notes are given on the life history, host range and control of *Aonidiella aurantii* in Western Australia. Spraying with 2½ gal. white oil per 100 gal. water is the commonest method of control, and HCN gas fumigation is now rarely practised. Other sprays used are 1½–3¼ pt. 50% malathion per 100 gal., or 1¼ gal. white oil plus 1 pt. malathion per 100 gal. Parathion controls the red scale but may favour the soft brown scale (*Coccus hesperidum*). The predatory wasp *Aphytis chrysomphali*, which was introduced in 1905, is widely established locally and exercises some control. Another predatory wasp, *Comperiella bifasciata*, was introduced in 1943, but its local status has not yet been assessed.

1173. LAURENT, R.
Quelques réflexions à propos du pou de Californie. **(Some reflections on the Californian scale insect.)**
SMIRNOFF, W. A.
Aonidiella aurantii Mask (pou rouge de Californie) parasite des agrumes au Maroc, et les moyens de le combattre. ***(A. aurantii,* the Californian red scale parasite of citrus in Morocco, and measures for its control.)**
ASSOCIATION SYNDICALE DE LUTTE CONTRE LES PARASITES DES PLANTS DE SIDI-SLIMANE.
Le pou rouge de Californie (*Aonidiella aurantii*). **(The Californian red scale insect *(A. aurantii).*)**
Fruits et Prim., 1959, **29**(301): 3-5; 6-14, bibl. 13, illus.; and 15-16.

The first article deals only with the economics of control in Moroccan orange groves. The other 2 articles recommend treatments or combinations of treatments, involving HCN fumigation, painting trunks and branches with ethyl- or dimethyl parathion in oil, and spraying with oil containing either of these parathion compounds or Chlorthion.

1174. JAKOVLEV, B. V.
A new pest of sub-tropical crops. [Russian.]
Sad i Ogorod, 1959, No. 7, pp. 59-60, illus.

The life history and host range of citrus white fly (*Dialeurodes citri*) in the Adžar ASSR are briefly described. Two applications of DDT gave good control of adults and larvae but were harmful to beneficial insects. A third treatment against the larval stages was made in September–October with petroleum-oil + Thiophos, and after harvest, in November–December, the trees were fumigated with HCN. In further trials DDD, like DDT, was found effective only against adults and larvae. The ovicide ethyl sulphonate at 0·3% was ineffective against the eggs but caused 100% mortality in the emergent larvae.

Citrus—fruit composition and handling.

(*See also* 269, 1128.)

1175. Lime, B. J., and others.
Pigmentation, pigment analyses and processing of colored grapefruit.
J. Rio Grande Valley hort. Soc., 1959, **13**: 30-8, bibl. 11.

Two methods are given for measuring the lycopene and carotene contents of Red Ruby grapefruit, and changes in their relative amounts during development are described. [See also *H.A.*, 28: 1840p.]—U.S. Fruit Veg. Prod. Lab., Weslaco, Tex.

1176. Purcell, A. E.
Carotenoid pigment formation in colored grapefruit.
J. Rio Grande Valley hort. Soc., 1959, **13**: 39-44, bibl. 13.

The seasonal development and distribution of carotenoid pigments in coloured grapefruit are described. It is suggested that the accumulation of carotenoids is due to the inefficient or only partial use of their precursors, possibly mevalonic acid, during normal metabolism.—U.S. Fruit Veg. Prod. Lab., Weslaco, Tex.

1177. Purcell, A. E.
Seasonal development of carotene and lycopene in grapefruit.
J. Rio Grande Valley hort. Soc., 1959, **13**: 45-53, bibl. 8.

Lycopene was found to attain its maximum concentration in Ruby Red grapefruit in the period August 15–September 10 in all the 4 years investigated. Thompson grapefruit showed a parallel development and decline. A decline of carotene began after that of the lycopene, but the date varied from year to year. Lycopene was found in immature white grapefruit and showed similar seasonal changes.—U.S. Fruit Veg. Prod. Lab., Weslaco, Tex.

1178. Krezdorn, A. H., and Maxwell, N. P.
Fruit quality studies of eight strains of red fleshed grapefruit on two rootstocks.
J. Rio Grande Valley hort. Soc., 1959, **13**: 54-8, bibl. 5.

No significant differences in standard criteria of quality and shape were obtained in the first 3 fruiting years between either varieties or rootstocks. A slight tendency towards higher acid and juice contents was observed in trees on Cleopatra mandarin rootstock. As the trees aged, the percentage brix and acid content increased.—Tex. agric. Exp. Stat., Weslaco.

1179. Zaganiaris, S.
Chemical studies of bitter orange juice of Greek origin. [French.]
Chim. et Industr., 1959, **81**: 544-8, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-178.

Data regarding the contents of sucrose, reducing sugars, N compounds, ash, etc., are reported, together with the formaldehyde and chloramine values and the ratios between these values and the acidity of the juice.

1180. (Macrill, J. R., Nixon, H. W., and Harding, P. L.)
Refrigerated warehouse practices.
Citrus Ind., 1959, **40**(8): 14-15, 18-19; and **40**(9): 14, 18, bibl. 28.

Methods of harvesting, grading and packing citrus in relation to the design of a refrigeration plant.

1181. Anon.
Bulk handling.
Citrus News, 1959, **35**: 39, 41, illus.

Growers' experiences with various types of large container.

1182. (Smith, R.)
New ideas on produce handling. Handling system for lemons.
Apple Res. Dig. Yakima, 1959, No. 149, pp. 1-2, illus.

Transporting lemons to the packing house in nesting, press-board drums, each containing 200–250 lb., is described. These relatively small containers are considered feasible for bulk harvesting when few lemon fruits are picked per tree.—Univ. Calif., Los Angeles.

1183. Eaks, I. L., and Jones, W. W.
Rind staining and breakdown of navels.
Calif. Citrogr., 1959, **44**: 390, 440-2.

The results of studies under central California conditions may be summarized as follows: There were indications that high N fertilization may influence susceptibility; whitewash, 2,4-D or NAA sprays did not appear to affect susceptibility; there were indications that susceptibility was affected by rootstock and insecticidal sprays, but results were variable; relatively high levels of gibberellic acid tended to increase the severity of rind staining and breakdown; susceptibility increased as the season progressed; late in the season fruit from the north side of the tree consistently showed about twice as much injury as fruit from the south side; fruit brushed immediately or two or four days after harvest showed little difference in the amount of injury that developed; during brushing, stiffer brushes and longer brushing resulted in more injury, but different soaking solutions and times had little effect.

1184. deFossard, R. A.
Brown stem of oranges investigation.
Bull. Minist. Agric. Jamaica **56**, 1959, pp. 160, bibl. 26, illus.

Brown stem of oranges in Jamaica is a type of peel breakdown which generally develops after harvesting. Fruit developing under conditions of drought or physiological drought are less susceptible than those developing in better moisture conditions. Cultural conditions appear to have little effect on the occurrence of brown stem. Results from handling and packing-house trials, although variable, have emphasized that brown stem increases with delays in post-harvest treatments. Delays caused by de-greening and de-buttoning may be reduced by substituting the rigid selection of fruit on a colour-break basis and by alternative control measures for stem-end rot (especially Dowicide A—Hexamine treatment). Brushing the fruit after an initial delay in handling has proved particularly conducive to high percentages of brown stem. Diphenyl-impregnated wrappers gave excellent control of wastage, especially in combination with cold storage. The waxes Flavorseal 45 and 83 and No. 101A tended to increase brown stem, and Sta-Fresh was the best wax tested. Cold storage trials showed that fast cooling was best for fruit which received the present packing-house treatment, but for fruit handled more quickly slower cooling gave better results. Fruit should reach the right storage temperature within 2 days of its arrival at the cold store; constant temperatures between 40° F. and 45° F. are necessary, as well as high humidities.

1185. Eckert, J. W., and Kolbezen, M. J.
Fruit decay control program at the Citrus Experiment Station.
Calif. Citrogr., 1959, **44**: 110, 120-2, illus.

Research which has led to the commercial use of diphenyl and ammonia for the control of fruit rots is reviewed. Two promising new materials are mentioned, one of which (sodium dichloroisocyanurate) can control spoilage under certain conditions.

1186. Long, J. K.
Mould control. Cleaning, sterilisation and waxing procedures in the pre-packing treatment of citrus fruits.
Citrus News, 1959, **35**: 62, bibl. 3.

Recommendations for citrus fruit preservation [see also *H.A.*, 29: 3988].

Dates.

1187. Raz, D.
The use of polyethylene wraps in the rooting of high date offshoots.
Rep. 36th annu. Date Grs' Inst., Coachella, 1959, p. 19, bibl. 12, illus.

In winter an open tube of polythene is slipped over the offshoot, tied at the bottom and filled with wet shavings. The top is then tied. Roots are visible after a few weeks and the offshoot may be removed and planted out in the spring. The author is of the opinion that palms grown from high offshoots prosper as well as those from lower ones.

1188. Furr, J. R., and Armstrong, W. W., Jr.
The relation of growth, yield and fruit quality of Deglet Noor dates to variations in water and nitrogen supply and to salt accumulation in the soil.
Rep. 36th annu. Date Grs' Inst., Coachella, 1959, pp. 16-18, bibl. 3.

In a 5-year trial water containing 1 ton of salt per acre-ft. was applied at 6, 10 or 14 ft. per year and N was applied at 0, 8 or 13 lb. per tree per year. Conductivities of the saturation extracts were 3 millimhos per cm. for the 14-ft. water supply and 4–7 for the 6-ft., the 10-ft. being intermediate. Salt accumulated more in the lower half of the irrigation run but was similar in the 0–8 ft. and 8–16 ft. soil zones. With the application of 10 ft. of water per year salt removal was adequate, but with 6 ft. it was not. Heavy N improved leaf growth and yield but reduced quality. In the first 3 years yield and quality were unaffected by differences in water supply, but in the last 2 years yields were lower in the 6-ft. irrigation plot. Grades, however, were not affected.—U.S. Date Field Stat., Indio, Calif.

1189. Armstrong, W. W., Jr., and Furr, J. R.
Root distribution of Khadrawy date palms in relation to frequency of irrigation.
Rep. 36th annu. Date Grs' Inst., Coachella, 1959, pp. 13-15, bibl. 14.

Significant differences in root distribution were not found when comparing palms growing in frequently irrigated plots and dry plots. Roots extended to at least 23 ft. in depth; root density was higher in clay and silt layers than in sand, and the peak root density was at 5–7 ft.—U.S. Date Field Stat., Indio, Calif.

1190. Cook, R. E.
Temperature and its relationship to the date crop.
Rep. 36th annu. Date Grs' Inst., Coachella, 1959, p. 18, bibl. 1.

In addition to work on heat units and ripening [abstracted in *H.A.*, 27: 812], the author states that, if some allowance for an early or late bloom is made, a fairly accurate prediction of the crop ripening date can be made by June 30, or even by the end of April if June weather can be predicted.—Calif. Date Grs' Ass.

1191. NIXON, R. W.
Effects of gibberellin on fruitstalks and fruit of date palm.
Rep. 36th annu. Date Grs' Inst., Coachella, 1959, pp. 5-7, bibl. 1, illus.

Applications of GA to inflorescences or fruit stalks increased the length of the latter but produced an undesirable spiral curvature. Applications to fruit had various results, depending on variety and time of application, and included increased fruit length and decreased breadth, a tendency to shrivel prior to ripening, increased susceptibility to checking and blacknose and failure to develop normal colour. No benefit from applications to the fruit is suggested by these results.

1192. ROMEO, V.
Le piante epifite dell'Orto Botanico di Messina. Osservazioni fenologiche. (**Epiphytes in the Messina Botanic Gardens. Phenological observations.**)
Nuovo G. bot. ital., 1957, **64**: 266-71, bibl. 5, [received 1959].

The epiphytic flora of date palms and other *Phoenix* spp. is described.

1193. MAIER, V. P., AND SCHILLER, F. H.
Progress of chemical studies of Deglet Noor dates.
Rep. 36th annu. Date Grs' Inst., Coachella, 1959, pp. 8-10, bibl. 14.

On a dry-weight basis the polyphenol content of green dates is about 3%, the major components being polymeric leucocyanidins. The minor components are numerous and appear to include a flavone and a chlorogenic acid type compound. In addition, mesoinositol has been found in green date tissue. [From authors' summary.] Darkening and sucrose inversion studies are also reported.—Fruit Veg. Chem. Lab., Pasadena, Calif.

Macadamias.

1194. HAMILTON, R. A., AND FUKUNAGA, E. T.
Growing macadamia nuts in Hawaii.
Bull. Hawaii agric. Exp. Stat. **121**, 1959, pp. 51, bibl. 26, illus.

The chief subjects covered are: *Botanical: M. integrifolia* (the smooth-shell type) is the species grown. *Orchard siting:* Soil, wind, elevation, rainfall. *Varieties:* Seven selected varieties have been named after prolonged clonal selection and testing. *Propagation:* Rootstock production and side wedge grafting. *Top-working:* Bark grafting and cleft grafting. *Orchard establishment:* Windbreaks, spacing, planting. *Orchard management:* Pasturage, intercropping, cultivation and weed control, manuring, pruning, harvesting, husking, drying. *Diseases and pests:* Anthracnose, nut borer and rats.

1195. STOREY, W. B.
Progress report on the macadamia.
Yearb. Calif. Avoc. Soc. for 1959, 1959, **43**: 67-71.

Distinctions between *Macadamia tetraphylla* and *M. integrifolia*, the 2 species grown in California, with notes on adaptation, propagation, varieties and outlook. [See also *H.A.*, 28: 3027p.]—Univ. Calif., Riverside.

Olives.

(*See also* 260, 469.)

1196. DEL CAMPO, E.
Olivos en Colombia. (**Olives in Colombia.**)
Bol. Oleic. int., 1959, No. 49, pp. 1-30, bibl. 5, illus.

1197. CIAMPI, C., AND GELLINI, R.
Studio anatomico sui rapporti tra struttura e capacità di radicazione in talee di olivo. (**Anatomical study of the relationship between structure and rooting capacity in olive cuttings.**)
Nuovo G. bot. ital., 1958, **65**: 417-24, bibl. 11, illus.

Rooting was poor in cuttings with a continuous, or nearly continuous sheath of pericycle sclerenchyma, and good in those having numerous interruptions in this tissue.—Univ. Florence.

1198. BERNARDI, J. B., AND INFORZATO, R.
Enraizamento de ramos semi-herbáceos de oliveira. (*Olea europaea* L.) (**Rooting of olive softwood cuttings.**) [English summary 13 lines.]
Bragantia, 1958, **17**: IX-XIV, bibl. 3, illus.

Oleaster cuttings planted in a sand-moss medium in boxes in the greenhouse and covered individually with glass jars showed up to 100% successful rooting after 4½ months. When cuttings of an unknown olive variety of poor rooting quality were treated with different hormone products, the percentage of successful rooting was no higher than in the plain water control, but the greatest root growth and number were given by NAA and Seradix B No. 2 powder.

1199. DE LA ROCHA G., G.
Propagación vegetativa del olivo. (**Vegetative propagation of olives.**)
Bol. trim. Exp. agropec. P.C.E.A., Lima, 1958, 7(4): 18-22.

See *H.A.*, 29: 1859.

1200. BREVIGLIERI, N.
L'olivicoltura ad una svolta tecnica. Come incrementare e migliorare la produzione del salutare olio di oliva. (**Olive growing at a technical turning point. How to increase and improve the production of health-giving olive oil.**)
Ital. agric., 1959, **96**: 587-604, illus.

Present emphasis in Italy is on bush forms in general, and on hedge and free-palmette systems in particular, for intensive cultivation [see *H.A.*, 29: 849]. The same trend is becoming obvious in other Mediterranean countries, e.g. in modern Spanish groves, where cuttings are planted in groups of 3 and the resulting bushes are kept low.

1201. Di Martino, V.
L'olivo sente lo stimolo della coltivazione razionale. **(Olives are stimulated by rational cultivation.)**
Ital. agric., 1959, **96**: 801-8, illus.

Striking increases in yield were achieved by applying farmyard manure biennially in early spring and NPK annually in April, pruning annually, spraying every May and September with a copper-arsenic solution, weeding in July and August, and applying foliar N after flowering. The control trees were given the customary local treatment, including pruning once in 3 years, irregular and deficient organic manuring, and little or no NPK or protective spraying.

1202. Scaramuzzi, F., and Andreucci, E.
Indagini e osservazioni sui danni provocati dalle minime termiche del Febbraio 1956 agli olivi nei vivai di Pescia (Toscana). **(Investigations and observations on injuries to olives in the nurseries of Pescia (Tuscany) caused by the low temperatures of February 1956.)** [English summary ½ p.]
Nuovo G. bot. ital., 1957, **64**: 19-124, bibl. 63, illus., [received 1959].

Detailed morphological and anatomical descriptions are given of the frost damage. The 5 principal varieties studied each differed in cold resistance according to age. The most resistant 1-year-old plants were those of Frantoio, followed in descending order by Coratina, Leccino, Canino and Moraiolo. For 2nd year plants the order was: Frantoio, Canino, Leccino, Moraiolo and Coratina, but among the mother trees Moraiolo was the most, and Frantoio the least resistant. Injury could not necessarily be assessed at the time of the cold spell; thus, nursery plants of Maurino appeared to have suffered severely, but made a very good recovery, whereas those of Moraiolo showed little sign of injury at first, but eventually deteriorated markedly. Suggestions for minimizing frost-damage risks include avoiding fertilizer applications from early August onward and preparing supports in the autumn for possible emergency use of protective matting in winter. The use of 1·5% bordeaux mixture to limit the growing season is not recommended except in mild winters. Transplanting from grafting beds to nurseries in late November, rather than in the following spring, is strongly recommended.

1203. Russo, G.
Reperti bio-ecologici sul *Dacus oleae* ed esperimenti di lotta antidacica in Ascea (Salerno) nel 1957. **(Bio-ecological observations on *Dacus oleae* and control trials in Ascea (Salerno) in 1957.)** [English summary 2¾ pp.]
Ann. Sper. agrar., 1959, **13**: 423-75, bibl. 2.

The main control trials consisted of high- and low-volume sprays applied in early July at the beginning of egg-laying, in early August, in early September after the first summer-autumn rains and 3–4 weeks later. Good results were obtained with: (1) a DDT-parathion summer treatment followed by one summer-autumn treatment with parathion plus copper sulphate and another with Rogor L; (2) two summer-autumn treatments with Rogor L; and (3) a DDT-parathion summer treatment followed by one treatment with parathion plus copper sulphate and one with diazinon. Pilot trials were also carried out with a special copper-parathion mixture, two organo-phosphorus compounds, a carbamate and diazinon; and with hydrolysed proteins and biammoniacal salts as baits. [For previous year's work see *H.A.*, 29: 2910.]

1204. Whitehead, V. B.
Olive tingitid can be controlled successfully.
Fmg S. Afr., 1959, **35**(7): 27, illus.

Metasystox (16 fl. oz. per 100 gal.) gave excellent control of the olive tingitid (*Teleonemia australis*). An additional spray of summer oil plus lead arsenate should be applied for beetle control. [See also *H.A.*, 29: 858w.]—W.P. Fruit Res. Stat., Stellenbosch.

1205. Hartmann, H. T., and others.
Optimum time for olive harvest.
Calif. Agric., 1959, **13**(10): 4-5, 10.

See *H.A.*, 29: 4011.

1206. Matarese, L.
L'olio vergine di oliva. **(Unrefined olive oil.)**
Ital. agric., 1959, **96**: 353-61.

Composition, food value, effects of refinement, and legal definition.

Passion fruit.

1207. Bowers, F. A. I., and Dedolph, R. R.
A preliminary report on pruning of passion fruit.
Hawaii Fm Sci., 1959, **7**(4): 6-8, illus.

Light pruning of trellis-trained vines resulted in a 25% increase in yield over no pruning or heavy pruning, and 10% over medium pruning.

1208. Akamine, E. K., and Girolami, G.
Pollination and fruit set in the yellow passion fruit.
Tech. Bull. Hawaii agric. Exp. Stat. **39**, 1959, pp. 44, bibl. 31, illus.

4-year investigation into problems concerning adequate fruit set in *Passiflora edulis flavicarpa* is escribed. Self- and cross-incompatibility in cer- in clones was found to be the main reason for poor uit set, but this also occurred in compatible osses and was caused by insufficient pollination, et pollen, upright-styled flowers, fruit fly damage d disparity in blossoming time. Carpenter bees e the natural pollinators, but fruits from hand- ollinated flowers were larger and juicier than those om insect-pollinated flowers. There was a high ositive correlation between fruit size and quality d the number of pollen grains placed on the ower. Upright-styled flowers proved to be erile females but functional males.

Tung.

209. BARROWS, H. L.

The response of one-year-old tung trees to rates and placement of zinc as affected by selected soil series.

Diss. Abstr., 1959, **20**: 16, being *L.C. Card No. Mic.* 59-1722 of 149 pp.

field experiments zinc sulphate mixed with cu. ft. of soil in the rooting zone reduced total owth and feeder-root concentration in 3 out of 4 st soils. In pot experiments top and root growth creased when leaf Zn was increased up to 0·77 e/100 g.; above this level top growth was reduced and this was followed by a reduction in root growth. Leaves collected from the main stems had higher Zn contents and provided a more sensitive measure of Zn uptake than leaves collected from laterals. Zinc uptake, as measured by leaf analysis, was highest when Zn was mixed with soil of the rooting zone at 4 oz. per tree. Root concentrations of Zn were about 10 times those of leaf concentrations. Leaf and root analyses showed a significant Mg : Zn interaction. Zinc availability was studied in each of the four test soils, and recommendations are made for supplying adequate Zn to young tung trees on these soils.—Univ. Fla.

1210. BAUMANN, L. A.

Improving the marketing of tung nuts.

Mktg Res. Rep. U.S. Dep. Agric. **281**, 1958, pp. 31.

In 550 loads of tung nuts examined the range of oil content was from 8·1 to 25·3%, with 60% of the loads lying between 15·0 and 19·6%. In individual orchards, however, the range was much less, the widest being 7·1% and 60% of the loads showing not more than 1·8%. Haulage and processing costs could be reduced by hulling on the farm and lowering the moisture content by improved storage. The considerable capital costs involved could be minimized by centralized co-operative organization.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 13.)

11. LUGO-LÓPEZ, M. A., HERNÁNDEZ-MEDINA, E., AND ACEVEDO, G.

Response of some tropical soils and crops of Puerto Rico to applications of lime. [Spanish summary ½ p.]

Tech. Pap. P.R. agric. Exp. Stat. Río Piedras, **28**, 1959, pp. 19, bibl. 31.

gar cane responded to lime only when the soil as markedly acid, the response being greater in e ratoon crops. Similar results were obtained th coffee and tobacco. West Indian cherry, it not pineapple, benefited considerably from lime eatment.

12. LEATHER, R. I.

Diseases of economic plants in Ghana other than cacao.

Bull. Ghana Minist. Food Agric. **1**, 1959, pp. 40, bibl. 20.

cluding an alphabetical list of crops, their seases and control measures.

13. BURNETT, G. F.

Pest control. Control of land crabs ("lairo tui") in Fiji.

Agric. J. Dep. Agric. Fiji, 1959, **29**: 36-8, bibl. 1.

The method recommended for the control of *Cardisoma carnifex* in gardens is baiting the holes with a mixture of rice bran and either 10% of BHC 50% w.p. or 1% of aldrin 50% w.p. bound together with sea water.

Areca palms.

1214. NAIDU, G. V. B.

Betelvine cultivation in areca gardens and its benefits.

Arecanut J., 1959, **9**: 128-30, bibl. 4, illus.

A study of 14 areca gardens, in which betel vines were grown using the areca palms as supports, showed that income was greatly augmented. Cultivation was more thorough, manuring more liberal and disease incidence among the palms lower than in equivalent gardens without the vines. Sun-scorch damage to the palm trunks was non-existent.

1215. PILLAI, G. B., AND KURIAN, C.

Some observations on areca thrips, *Rhipiphorothrips cruentatus* Hood (Thripidae: Terebrantia: Thysanoptera).

Arecanut J., 1959, **9**: 123-5, bibl. 6, illus.

This pest was first observed attacking areca in India in 1956 and appears to be on the increase. The morphology and life history of the insect are described. Control by nicotine dust or organophosphorus compounds is recommended. The existence of an endo-parasite, *Thripoctonus maculatus*, may make biological control feasible.—Cent. Coconut Res. Stat., Kayangulam.

1216. Pillay, P. P., and Gopalakrishnan, V. T.
Preservation of fresh arecanut.
Arecanut J., 1959, **9**: 126-7.

In 0·25% benzoic acid solution to retain colour and flavour.

1217. Dutta, S. N., and Dutta, A. B.
Some important characteristics of genuine betel-nut.
Curr. Sci., 1959, **28**: 198-9, bibl. 3.

Genuine betel nuts (*Areca catechu*) of all grades could be readily distinguished from the adulterant *Ramsupari* by their total ash, water, alcohol and ether extracts, quercitannic acid, arecoline and areca red concentrations. The greatest differences were found in the alcohol and ether extracts and in the amount of arecoline, values for all of which were much lower in the adulterant.—Cent. Lab., Calcutta Corpn.

Bananas and abaca.

(*See also* 65, 269, 1445, 1451.)

1218. Tomlinson, P. B.
An anatomical approach to the classification of the Musaceae.
J. Linn. Soc. (*Bot.*), 1959, **55**: 779-809, bibl. 23, illus.

Musa; including *Ensete*, anatomically a quite distinct genus, with some affinities with *Ravenala-Strelitzia.*

1219. McRae, K. B.
The lady finger banana.
Qd agric. J., 1959, **85**: 469-71, illus.

Hardiness, strains, fruit quality and disease status.

1220. Dugain, F.
Le sulfate d'ammoniaque dans le sol en culture bananière de bas-fond. (**Ammonium sulphate in the soil for growing bananas in low-lying areas.**)
Fruits d'Outre Mer, 1959, **14**: 163-9, bibl. 8.

Applications of ammonium sulphate at 1 or 2 tons/ha. in 2–12 instalments per year, to an already acid banana soil, progressively reduced the pH over 2 years and, at the higher rate, reduced the amount of K available from applications of potassium chloride. The lower the soil pH over the range 4·5–6, the lower were the yields of bananas. The fractional application of N was more profitable than infrequent applications of larger quantities. [See also *H.A.*, 29: 1982h.]—I.F.A.C., Foulaya, French Guinea.

1221. Oppenheimer, C., and Gottreich, M.
Studies on growth and development of the dwarf banana in the coastal plain of Israel. V. The influence of differential thinning, during the first year, on time of flowering and yield of the three following seasons.
Ktavim, 1959, **9**: 241-59, bibl. 4.

The main treatment tested consisted of one or two fruiting suckers left per stool. Yields of double stools were always considerably higher in the 2nd year, but for the total 3-year period the advantage was not more than 5–18%. In all plantations double stools were considerably weakened and suckers suitable for the third harvest were more difficult to find. It is recommended that a fixed thinning schedule should not be used during the first season, but that the extent of thinning be based on the strength of the stool. [For part IV, see *H.A.*, 29: 2924.]—Agric. Res. Stat., Rehovot.

1222. Trupin, F.
Coupe du bourgeon mâle sur l'inflorescence du bananier Gros Michel. (**Removal of the male bud from the inflorescence of Gros Michel bananas.**)
Fruits d'Outre Mer, 1959, **14**: 389-90, illus.

Removing the male section of the inflorescence after flowering gave an increase of 4·5% in average bunch weight of harvested fruit and substantially increased the resistance of the bunches to all except the most violent winds. The number of hands per bunch was increased by an average of 1·5%, but this was an indirect result of increased wind resistance, because normally the largest bunches are the first to be broken by tornadoes.—I.F.A.C.

1223. van der Westhuyzen, J. J. N.
Banana production in Natal. Yields can be much higher.
Fmg S. Afr., 1959, **35**(8): 44-5, illus.

Factors which can limit production are discussed. They include thrips, for which dusting of the bunches with 2½% DDT, 4 or more times at fortnightly intervals, is recommended.

1224. Schmitz, G., and Blomme, A.
Un moyen de lutte contre le charançon du bananier: le trempage-pralinage. (**Controlling banana weevil by dipping in an insecticide-clay mixture.**)
Bull. Inf. I.N.É.A.C., 1959, **8**: 177-88, bibl. 2, illus.

In a preliminary experiment banana suckers, dipped beforehand in semi-liquid clay containing an insecticide, were planted on land heavily infested with banana weevils (*Cosmopolites sordidus*). Endrin gave the best control, namely 86% plant survival after 7 months. In two subsequent trials, in which it was compared with inorganic and other organic insecticides, endrin emulsion (20%) again gave the best survival, namely 80 to 87% 12 to 14 months after planting; and it also gave the best yields per ha. The treatment is simple, and only 1·3–1·5 litres of endrin emulsion is required per 1,000 plants.

1225. MANN, G. E.
Carbon dioxide production and sugar formation in the ripening banana *(Musa cavendishii)*.
Diss. Abstr., 1959, **20**: 874, being *L.C. Card No. Mic.* 59-3079 of 141 pp.

The respiration intensity of an unripe banana, at 68° F. in 1 : 1,000 ethylene, rose rapidly from a pre-climacteric value of 21 to a peak of 140 mg. CO_2/kg./hr. For spontaneously ripened fruit the peak value was about 120 mg. CO_2/kg./hr. The elevation in sugar content generally lagged behind the rise in respiration intensity. At fairly advanced stages of ripening maximal sugar contents of 18–20% (wet basis) anthrone "glucose" were reached in the pulp. The contents of fructose, glucose and sucrose in pulp and skin were similar in ethylene-stimulated and naturally ripened fruits. Two other sugars were observed in the pulp, one of which showed the chromatographic properties of maltose and appeared only during the early stages of ethylene ripening; the other compound appeared during the later stages of ripening, with or without ethylene.—La St. Univ.

1226. HENDERSON, R. W., MORTON, R. K., AND RAWLINSON, W. A.
Oligosaccharide synthesis in the banana and its relationship to the transferase activity of invertase.
Biochem. J., 1959, **72**: 340-4, bibl. 19, illus.

A trisaccharide formed by the hydrolysis of the starch during the ripening of Cavendish bananas has been provisionally identified as 6^G-β-fructosylsucrose.—Dep. Biochem., Univ. Melbourne.

1227. MEREDITH, D. S.
Some observations on *Trachysphaera fructigena* (Tabor et Bunting) with particular reference to Jamaican bananas.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 127-31, bibl. 5, illus.

Trachysphaera fructigena has been recorded for the first time on Jamaican Lacatan bananas. The fungus was observed occasionally on almost mature fruit, which had been stored for several days inside ripening rooms in England, but not on newly arrived, green fruit. Symptoms of disease are comparable with those often observed on fruit from West Africa. Experimental inoculations showed that the fungus readily infects wounded, immature fruit, often resulting in the appearance of advanced symptoms after 5–7 days' storage at 65°–75° F. All attempts to infect healthy, unwounded fruit were unsuccessful. It is suggested that infection of Jamaican fruit was initiated by spores of *T. fructigena* that remained inside the ripening rooms after removal of severely infected West African fruit: infection may have occurred through existing skin injuries. Ripening-room hygiene is discussed briefly in relation to disease epidemiology. [From author's summary.]

1228. LAU, H. T. S., AND SCOTT, F. S., JR.
Some indications of consumer preferences for bananas.
Hawaii Fm Sci., 1959, 7(4): 4-6, illus.

The conclusions reached after a study of banana sales in Honolulu supermarkets were that banana buying was mainly impulse buying, that a fair proportion of buyers could not identify varieties, that taste was the most important criterion for purchase, that the 6-finger size bunch was the most popular and the half-ripe stage preferred to the green or fully ripe.

1229. MAPOTHER, H. R., AND TAPSCOTT, A. R.
Spray application problems: L. The use of fluorescent materials as tracers in spray liquids: Experiments with abaca *(Musa textilis*, Née).
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 142-6, bibl. 6, illus.

The use of fluorescent materials in spray liquids affords a rapid and simple method of determining the type and degree of deposit obtained on foliage. The method, in its present form, is not quantitative. The technique has been used with success to investigate the type of spray cover given by different types of spray equipment on abaca in North Borneo. [Authors' summary.]

Cacao.

(*See also* 116, 1432.)

1230. FAO.
Report of the First FAO Technical Cacao Meeting held in Accra, Ghana, February 1959,
F.A.O., Rome, 1959, pp. 32.

An outline of discussions, but not including abstracts of papers presented.

1231. SHAW, D. D., CARTLEDGE, I., AND OTHERS.
Cocoa in Papua and New Guinea. I. An economic study of the cocoa growing industry in Papua and New Guinea. II. Long-term economic prospects for the cocoa industry of Papua and New Guinea.
[*Publ.*] *Dep. Territories, Commonw. Aust.*, Canberra, 1958, pp. 62 and 21.

A detailed survey and appraisal of a rapidly expanding industry.

1232. LOCKARD, R. G., VAMATHEVAN, P., AND THAMBOO, S.
Mineral deficiency symptoms of cacao grown in sand-culture.
Bull. Dep. Agric. Malaya **107**, 1959, pp. 20 + plates, bibl. 32, illus., $4 (Malayan) or 9s. 6d.

Major and minor elements are dealt with. An important feature is the series of coloured drawings illustrating leaf symptoms.

1233. Hanna, A. D., and others.
An investigation into the possible control of the mealy bug vectors of cacao swollen-shoot virus by trunk implantation with dimefox.
Bull. ent. Res., 1959, **50**: 209-25, bibl. 9.

A series of experiments is described in which dimefox was placed in holes drilled in cacao trees at ground-level and the results assessed by counting mealybugs on felled trees 6 and 9 weeks later. There were no significant differences due to drilling the holes 4 or 2 in. apart. The lowest mealybug counts were achieved at dosage rates of 281 p.p.m. in one experiment and of 317 p.p.m. in another, based on the estimated aerial weight of the tree. Implantation in April–May was more effective than treatment in October–November.—W.A.C.R.I., Tafo.

1234. Spence, J. A.
The problem of *Phytophthora palmivora* on the cocoa plant.
J. agric. Soc. Trin. Tob., 1959, **59**: 97-111.

Black pod has caused monthly losses ranging from 17 to 68·5% in Trinidad. The disease and causal organism are described. Of control measures in use, the destruction of infected pods and more frequent harvesting appear to be effective.—Dep. Agric., Trinidad.

1235. Tollenaar, D.
Increased cocoa production by foliar copper applications as an effect additional to witches' broom disease control.
Trop. Agriculture Trin., 1959, **36**: 177-88, bibl. 19, illus.

The results of trials on several plantations in Ecuador in 1955–56 confirmed that mist applications of Copper-Sandoz given monthly or bi-monthly considerably reduced witches' broom disease on pods and branches, whereas dithane was ineffective. High volume spraying, however, tended to damage the flowers and reduce fruit set. Copper applications to the leaves resulted in increases in flowering, effective fruit setting and pod production. The addition of zinc and biuret-free urea to the spray proved advantageous in some cases.

1236. Goberdhan, L.
The present situation of *Ceratostomella* disease of cocoa in Trinidad.
Stell, G.
The role of *Xyleborus* and *Platypus* shothole borers in the spread of *Ceratostomella* disease of cocoa and measures for their control.
Publ. Exch. Serv. Caribbean Commiss. Cocoa **89**, 1959, pp. 1-6, from *Trop. Abstr.*, 1959, **14**, Abstr. g1712.

The first paper discusses the symptoms and distribution of *Ceratostomella* disease in Trinidad and gives a review of the preventive measures to be adopted. In the second paper the role of shot-hole borers in relation to the disease and its control are dealt with. Control measures recommended are: (1) maintain trees in a healthy condition and keep them free from injuries, (2) remove infected trees, (3) give a protective spray to the bark of the tree (toxaphene, dieldrin, BHC). (4) use wound dressings, and (5) sterilize all tools used.

1237. Raw, F.
Studies on the chemical control of cacao mirids, *Distantiella theobroma* (Dist.) and *Sahlbergella singularis* Hagl.
Bull. ent. Res., 1959, **50**: 13-23, bibl. 18.

Tests on sprayed pods showed that BHC was more toxic and quicker acting than DDT. In tests on sprayed leaves BHC had a powerful though transient fumigant action, but DDT had none. In persistence tests on pods DDT was still effective after 3 weeks; BHC had a residual toxic effect for several days and depressed feeding for a fortnight. BHC appeared to have a local systemic action, which persisted after the surface deposit became ineffective. Aldrin had a high toxicity and powerful fumigant action and appeared a promising alternative to BHC. It was concluded that BHC would be more effective than DDT for treating mature cacao, especially in low-volume spraying. —W.A.C.R.I., Tafo, Ghana.

1238. Powell, B. D.
Cocoa fermentation: a note on the anaerobic and aerobic phases.
Roberts, J. B.
Cacao fermentation: the existence of anaerobic cotyledons during fermentation.
Chem. Ind. Lond., 1959, No. 31, pp. 991-2, bibl. 8, and No. 45, pp. 1410-1, bibls 3 and 4.

The first author provides evidence of beans of good flavour and appearance being obtained from fermentations carried out in the presence of much air and suggests that the anaerobic phase, previously considered essential, is unnecessary and does not always occur in large scale fermentations. The second author challenges this view and suggests the possibility of anaerobic conditions within the cotyledons. A reply from the first author is appended.

1239. Bienfait, A.
Les bases xanthiques des fèves de cacao du Congo belge. **(The xanthic bases of cacao beans from the Belgian Congo.)** [Flemish summary ½ p.]
Bull. agric. Congo belge, 1959, **50**: 689-96, bibl. 9.

The xanthic bases, theobromine and caffeine, govern the commercial quality of a fermented cacao. The author determined the contents of these constituents in a number of samples of cacao beans from the Belgian Congo. He reports on the effect of date of harvesting on the contents and shows that they vary considerably during fermentation. Fermentation causes a movement towards the skin, but this hardly affects the kernel. [From author's summary.]

1240. Cocoa, Chocolate and Confectionery Alliance.
Raw cocoa: manufacturers' quality requirements.
[*Publ.*] *Cocoa, Chocolate and Confectionery Alliance*, London, 1959, pp. 8.

A guide to agriculturists and scientists, including details of the "cut test".

Cashews.

1241. Abraham, E. V.
Killer insects of cashew.
Indian Fmg, 1959, **9**(3): 14-15, illus.

Helopeltis antonii can be controlled by 0·1% DDT spray, *Chelaria haligramma* larvae by 0·2% DDT spray, and the mealy bug *Ferrisiana virgata* and the aphid *Toxoptera odinae* by 0·025% parathion or 0·1% BHC. Parathion also controls *Ceroplastes floridensis*, and 0·05% BHC is effective against the larvae of *Euproctis scintillans*.

1242. Swaine, G.
A preliminary note on *Helopeltis* spp. damaging cashew in Tanganyika Territory.
Bull. ent. Res., 1959, **50**: 171-81, bibl. 6, illus.

Distribution and damage are described. Three or applications of 0·5% γ-BHC dust at 15-day intervals prior to flowering of the main crop gave promise of control in the field.—Dep. Agric., Arusha, Tanganyika.

1243. Jacqmain, D.
La noix d'anacarde. (**The cashew nut.**)
Oléagineux, 1959, **14**: 527-36, bibl. 232.

The chemistry of nut and shell reviewed.

1244. Farrales, J. F.
Cashew juice expeller: its design and development.
Plant Ind. Dig., 1958, No. 21, pp. 16-19, from *Trop. Abstr.*, 1959, **14**, Abstr. g2785.

For the production of wine from the juice of the cashew apple.

Coconuts.

1245. Ibrahim, P. A. M., and Ramanathan, T.
Coconut industry in Edakkanad in Chingleput District.
Coconut Bull., 1959, **13**: 78-84, illus.

Including notes on the control of diseases and pests.

1246. Orian, A. J. E.
Report on a visit to Diego Garcia.
Rev. agric. sucr. Maurice, 1959, **38**: 127-43, bibl. 41, illus.

Mainly dealing with coconut problems, notably the rhinoceros beetle.

1247. Davis, T. A.
Coconut palm possessing characteristic unbranched bunches.
Coconut Bull., 1959, **13**: 71-3, illus.

The so-called *spicata* variety, with unbranched peduncles and few male flowers, is described.

1248. Satyabalan, K.
A note on the comparative study of the seedlings of natural cross dwarf (dwarf female × tall male) and those of pure dwarf (self-pollinated) in the nursery.
Indian Coconut J., 1958, **11**: 102-5, bibl. 4, illus.

Natural cross dwarf coconut seedlings made more vigorous growth than pure dwarf seedlings and showed signs of being early and prolific bearers. Hybrid seedlings appear to be easily obtained in plantations containing both parents.—Cent. Coconut Res. Stat., Kasaragod.

1249. Shrikhande, V. J.
Some considerations in designing experiments on coconut trees.
Indian Coconut J., 1958, **11**: 140-56, bibl. 6.

The author has determined the relative contributions of genetic and environmental factors to the total variation within plots for a number of plot sizes. He suggests 2 new methods of arranging blocks and plots making use of the past records of the plantation so as to reduce the within-block variation and increase the between-block variation due to the genetic component.—I.C.A.R., New Delhi.

1250. Iyer, T. A. G.
Statistical analysis of experimental yield data from coconut trees.
Indian Coconut J., 1958, **11**: 106-24, bibl. 14.

It was found better to analyse the yields of all the 9 trees in each plot than only those of the central trees. Covariance methods, using the yields from pre-experimental years, increased efficiency. Significance was achieved only after 5 years.

1251. Sankaranarayanan, M. P., Verghese, E. J., and Menon, K. P. V.
A note on the tolerance of salinity by coconut palm.
Indian Coconut J., 1958, **11**: 133-9, bibl. 5.

Data are given of the soluble salts, pH and specific conductivity of sub-soil water after flooding of a coconut area with salt water. Even with a salt content as high as 6,380 p.p.m. in the water the palms showed only temporary leaf drop and nut shedding.—Cent. Coconut Res. Stat., Kayangulam.

1252. Pandalai, K. M., and Pillai, R. V.
Albinism in coconut seedlings.
Nature, 1959, **184**: 1163, bibl. 8.

Three experiments are described, in which normal green colour developed as a result of treatments which rendered Fe, already in the leaf, available to the plant. It is suggested that a genetic factor controls the requisite mobilization of Fe.—Cent. Coconut Res. Stat., Kasaragod, India.

1253. Velasco, J. R., and others.
Aluminum and its possible relationship to the cadang-cadang of coconut.
Philipp. Agric., 1959, **43**: 177-99, bibl. 19, illus.

In soils on which cadang-cadang was prevalent the level of available Al was 3-3½ times that in the soil of unaffected areas. Using tomato, *Ipomoea triloba* and *Phaseolus aureus* as test plants, the aluminium cation was found to be toxic at 2·5 p.p.m., whereas the aluminate ion was tolerated at 40 p.p.m. It is suggested that the disease may be caused by Al toxicity affecting the water economy, coupled with a low level of Cu in the soil.—Cent. Exp. Stat., Univ. Philipp.

1254. Pandalai, K. M., Sankarasubramoney, H., and Menon, K. P. V.
Studies on soil conditions in relation to the "root" and "leaf" diseases of the coconut palm in Travancore-Cochin. Part V. Exchangeable cations, cation exchange capacity and pH of coconut soils.
Indian Coconut J., 1958, **11**: 87-101, bibl. 24.

On sandy, alluvial loam and red loam soils, but not on laterite, the incidence of the disease is negatively correlated with the percentages of exchangeable cations and base saturation and the pH of the soil. Water-logging also favours the disease. The liming of affected areas is recommended. [For part IV, see *H.A.*, 29: 4036.]—Cent. Coconut Res. Stats, Kasaragod and Kayangulam.

1255. Brown, E. S.
Immature nutfall of coconuts in the Solomon Islands. I. Distribution of nutfall in relation to that of *Amblypelta* and of certain species of ants.
Bull. ent. Res., 1959, **50**: 97-133, bibl. 8, illus.

Premature nutfall and copra reduction in surviving nuts in the Solomon Islands is caused by the coreid bug, *Amblypelta*, by far the most damage being done by *A. cocophaga*. The associated ants, *Oecophylla smaragdina*, *Anoplolepis longipes* and, to a small extent, *Iridomyrmex myrmecodiae*, afford protection to the coconuts, but *Pheidole megacephala* does not. This paper discusses the distribution of the species concerned and the extent of crop loss.—Commonw. Inst. Ent.

1256. Vanderplank, F. L.
Studies on the coconut pest, *Pseudotheraptus wayi* Brown (Coreidae), in Zanzibar. II. Some data on the yields of coconuts in relation to damage caused by the insect. III. A selective residual insecticidal formulation and its effects on the ecology of the insect.
Bull. ent. Res., 1959, **50**: 135-49, bibl. 7, and 151-64, bibl. 12.

The damage caused by this pest was described in part I [see *H.A.*, 29: 1894]. The first of the above papers describes the ecological complexes depending on the associated ants, *Oecophylla longinoda* and, to a lesser extent, *Anoplolepis custodiens*, which are predators of *P. wayi* and so protect the coconuts, and *Pheidole punctata* and *A. longipes* which do not afford protection. By using the "vidaka damage rate" to assess losses and the recorded yields of government-owned plantations, the annual financial losses due to the pest in Zanzibar are estimated. Part III describes investigations into suitable insecticides. One, known as 10 DRDK and consisting of 23·5 lb. coumarone indene resin plus 235 lb. 80% *p,p′*DDT in a mixture of 100 gal. diesoline and 100 gal. kerosene had a selective action, controlling the pest, *Pseudotheraptus*, but not its chief predator, the ant *Oecophylla*.—Dep. Agric., Zanzibar.

1257. Nirula, K. K., and others.
Retentive toxicity of the field weathered insecticide to the eulophid parasite (*Trichospilus pupivora* Ferr.) associated with *Nephantis serinopa* Meyr.
Indian Coconut J., 1958, **11**: 125-32, bibl. 7, illus.

Residues of DDT 0·2% spray on coconut leaves remained toxic to adults of *T. pupivora*, a parasite of the coconut pest *N. serinopa*, for 8 weeks. BHC 0·2% caused heavy mortality for 2 days, but its toxicity to the parasite became insignificant after 6 days.—Cent. Coconut Res. Stat., Kayangulam.

1258. Lionnet, J. F. G.
A review of the biological control of agricultural pests in the Seychelles.
E. Afr. agric. J., 1959, **24**: 254-6, bibl. 7.

Mainly concerning coconut pests.

1259. Anon.
Chula copra dryer.
Coconut Bull., 1959, **13**: 113-19, illus.

This dryer facilitates the production of copra in the monsoon and consists of an air heater with furnace, power-driven fan and drying chamber. Taking 1,000 nuts in halves at a charge, 17 hours are required to reduce the moisture content to 5%. The copra resulting has been graded as excellent and commands a premium.

1260. ANON.
Village copra kiln.
Coconut Bull., 1959, **13**: 45-50, illus.

Detailed instructions and drawings for construction from local materials at a cost of Rs. 120.

1261. PILLAI, N. G., AND PANDALAI, K. M.
Total tannins in shed coconut buttons.
Sci. and Cult., 1959, **25**: 265-7, bibl. 10.

Shed coconut buttons up to 6 months old are of no commercial value, but their tannin content (10–12%) makes them of potential use to the leather industry.—Cent. Coconut Res. Stat., Kasaragod.

Coffee—general.
(*See also* 564, 1486.)

1262. U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
Record world coffee crops expected.
Foreign Agric. Circ. U.S. Dep. Agric. **FCOF 2-59**, 1959, pp. 11.

World production for 1959-60 is estimated at 66 million bags and a further slight increase in world trade is expected.

1263. BARRIE, J. W.
Coffee practices in Central America, the West Indies and Hawaii.
Papua New Guinea agric. J., 1959, **12**: 9-19, illus.

1264. LEJEUNE, J. B. H.
Rapport au gouvernement impérial d'Éthiopie sur la production caféière. (**Report to the Imperial Government of Ethiopia on coffee production.**)
Rep. FAO **797**, Rome, 1958, pp. 49.

Types and culture of arabica coffee and suggestions for improving the industry.

1265. INDIAN COFFEE BOARD.
Coffee in India. Planters' guide and calendar.
Publ. Res. Dep. Indian Coffee Bd, Balehonnur, 1958, pp. 80, Re. 1.

A practical manual covering all aspects of coffee growing.

266. INDIAN COFFEE BOARD.
Coffee statistics relating to India, 1955-56, Bangalore, pp. 283, Rs. 2.75.

Includes data on production, curing, marketing, prices, consumption and labour.

267. INDIAN COFFEE BOARD.
Tenth Annual Report of the Research Department of the Coffee Board, 1956-1957, Balehonnur, pp. 164, illus., being *Bull.* **10**, Re. 1.

Agronomy: Soil cultivation, manurial, pruning and mulching trials are in progress. Robusta topped at 4 ft. made better growth and gave better yields than plants topped at 3 ft., but the differences were not significant. Studies continue on seed germination following various treatments. The responses of arabica to gibberellic acid and its shade requirements are being studied. *Botany:* Breeding for disease resistance, high yield and vigour, with field trials of advanced selections and hybrids. Studies of grafting and of the rooting of sucker cuttings. In trials over 5 years plots of single stem robusta have produced yields 69% greater than multiple stem plots. Shot hole borer infestation of the latter continued to be heavy. *Chemistry:* Some preliminary results are reported of the many fertilizer experiments which are in progress. A pre-blossom application of Duraset improved the fruit set of arabica. *Entomology:* Control of a stem borer has been achieved with BHC 50% w.p., but tests of other insecticides continue; trials on the control of green bug and shot-hole borer have given inconclusive results. The application to the soil of sulphur at 1 cwt./acre, together with N fertilizers, has kept nematode populations at a low level compared with areas receiving no sulphur. *Mycology:* The results of many trials show that bordeaux mixture of 0·5% is as good as, or superior to, proprietary fungicides for the control of rust (*Hemileia vastatrix*); there appears to be no relationship between nutritional status and rust incidence. Seed dressing materials prevented seed decay and pre-emergence damping-off, but they were ineffective in controlling the damping-off of seedlings; in inoculation trials a *Rhizoctonia* isolate was shown to be an active parasite capable of causing damping-off in seedlings, whereas a *Fusarium* isolate was non-pathogenic. Seasonal and varietal susceptibility to brown eye-spot (*Cercospora* sp.) has been assessed; the age of the seedling also had considerable influence on disease incidence; the control of the disease by various fungicides is being studied.

1268. COFFEE RESEARCH STATION, RUIRU, KENYA.
Annual Report of the Coffee Research Station, Ruiru, and Coffee Research Services, Kenya, for 1958/9, 1959, pp. 70, 25s. An abridged version also appears in the Annual Report and Accounts of the Coffee Board of Kenya, *Kenya Coffee*, 1959, **24**: 165-85.

Field investigations: Yield increases of over 2 cwt. of clean coffee per acre were obtained by spraying with a 50% copper formulation, the higher the concentration the better being the response, even at 34 lb. per 100 gal. The end of May proved the most suitable time for application. Little difference was found in the response to urea when applied to the ground or as a high or low volume foliar spray. Selections S.L. 28 and 34 outyielded all the Blue Mountain selections in their first year of full bearing. Electrical soil warming reduced the rooting time for cuttings by 2 weeks, and internodal cuttings produced roots more rapidly than nodal. Of rooting media 25% vermiculite, 25% coffee hulls and 50% coarse sand was the most suitable for these cuttings. *Plant pathology and physiology:* While growth was greater, yields were considerably smaller in multi-stemmed trees compared with single-stemmed. Spraying with ½ pt. gibberellic acid (100 p.p.m.) per tree had no effect on growth. Germination tests on spores of *Hemileia vastatrix* showed them to be viable for 3–4 weeks, but to be killed by strong sunlight in less than 48 hrs. Experiments continue on the time of application, type and concentration of available fungicides for the control of this fungus. *Agricultural chemistry:* The high K uptake and content of the local hairy variety of Napier grass has been proved to be a major cause of Mg unbalance in coffee, when it is applied as a heavy mulch. *Entomology.* Against leaf miner Rogor, MC 7 and 47 and 0·01% pyrethrins were promising. The susceptible stages of the tip stem borer have proved to be the imago and the mature larva. A test aircraft spraying of malathion was successful against antestia bugs. Spot spraying with diazinon gave reasonable control of mealy bug. *Coffee growing in African areas:* Above 5,000 ft. in Meru, S.L. 28 and 34 produced excellent crops. At Fort Hall S.L. 6 remained leaf rust resistant. K.7 was outstanding in Elgon Nyanza. S. 288 and 795 were completely immune to Races I and II of rust, and await yield and liquoring evaluation.

1269. Keeler, J. T., Iwane, J. Y., and Matsumoto, D. K.
An economic report on the production of Kona coffee.
Agric. Econ. Bull. Hawaii agric. Exp. Stat. **12**, 1958, pp. 42, illus.

This study of small scale coffee production in the 1955-56 season in Hawaii indicates that the price of parchment would have had to fall below 36 cents per lb. before the return for the work done by the family fell below that paid to hired labour, and to 21 cents per lb. before the family income fell to zero. Average yields were high, but quality was declining and this might be counteracted by centralized processing. The use of extra fertilizer would have lowered production costs per lb.

Coffee—propagation and culture.

(*See also* 1211, 1267, 1268, 1432, 1465, 1470, 1484.)

1270. Bacchi, O.
Estudos sôbre a conservação de sementes. IV. Café. (**Seed storage studies. IV. Coffee.**) [English summary ⅓ p.]
Bragantia, 1958, **17**: 261-70, bibl. 10.

Newly harvested *typica* coffee beans were dried to 3 different moisture contents and stored at room temperature in sealed or open containers. The periods of viability of the beans stored in sealed containers were inversely proportional to their moisture contents, namely, 4, 8 and 21 months with moisture contents of 20, 13 and 10% respectively. The beans stored in open containers all remained viable for 8–10 months, their initial moisture contents having no effect on the period of viability, probably because the smallness of the samples permitted rapid drying.

1271. Vilanova M., T., and Guiscafré Arrillaga, J.
Coffee seedbeds and nurseries in El Salvador, C.A.
J. agric. Soc. Trin. Tob., 1959, **59**: 29-42.

Detailed instructions are given for establishing seedbeds and nurseries. Among pests, *Leucoptera coffeella, Coccus viridis, Saissetia* sp., noctuid larvae, *Pseudococcus brevipes* and nematodes are mentioned and effective control measures indicated.

1272. Anon.
Coffee grafting.
Plant. Chron., 1959, **54**: 203-4.

Using 2- to 3-month-old suckers for both scion and stock has given 70–80% success. Details of the method are described.

1273. Hatert, J., and Neerman, J.
Utilisation du presse-mottes en caféiculture. (**Using soil blocks in coffee planting.**)
Bull. Inf. I.N.É.A.C., 1959, **8**: 153-9, illus.

Transplanting coffee into compressed soil blocks was tested, using mixtures of termite clay, leaf mould and compost as materials for making the blocks, with and without fertilizer and mulch. Five months after planting in the blocks the percentage mortality was 1·5 compared with 7·5 for ordinary nursery stock, and height, diameter at collar and number of basal shoots were all greater. The labour involved was 26·4 man-days per 1,000 plants.

1274. Mendes, J. E. T., and Scaranari, H. J.
Disposição das mudas de café na cova. (**Arrangement of coffee seedlings in the planting hole.**) [English summary ½ p.]
Bragantia, 1958, **17**: 237-42, bibl. 4.

In a 6-year trial Red Bourbon plants were planted 4 per planting hole of 60 × 60 × 50 cm., either 15 cm. apart in a line or 30 cm. apart in a square. The two methods did not give significantly different yields.

1275. Bellasis, R. F.
Practical hints on pruning.
Kenya Coffee, 1959, **24**: 261-3.

The author outlines his own pruning practice for single-stem coffee, whereby 100–120 pieces of bearing wood are left on each tree, and which results in a crop of about 1 ton per acre in a normal year. Figures are given for a single tree personally handled from 1944 to 1952.

1276. VALLAEYS, G.
La pratique de la taille du caféier robusta. **(The practice of pruning robusta coffee.)**
Publ. Dir. Agric. For. Élev., Brussels, 1959, pp. 98, bibl. 12, illus., from *Trop. Abstr.*, 1959, **14**, Abstr. g2490.

This is a comprehensive study of coffee pruning conducted in the Belgian Congo. It deals with morphological and phenological details relating to pruning systems, choice of training method, training on multiple and single stems, restoration and conversion pruning, general considerations in relation to pruning time, pruning equipment, sanitary precautions and labour requirements.

1277. CORBERA V., J.
Efectos de intensidad de luz en plantas jovenes de cafeto. **(Effects of light intensity on young coffee plants.)**
Bol. trim. Exp. agropec. P.C.E.A., Lima, 1959, **8**(2): 11-15.

Very young seedlings of *typica* and *sumatra* coffee were transplanted and treated fortnightly with 0·25% ferbam. Half the plants were shaded with bamboo-strip matting, and in each sub-group half the plants received a monthly foliar spray of 10 g. of Nu-green (containing urea) per sq. m. Results recorded for 11-month-old plants show that neither treatment affected plant height, stem diameter, fresh weight or N content of the leaves. The unshaded plants had greater numbers of primary branches and leaves, higher resistance to *Cercospora caffeicola*, greater dry weight and higher values for leaf P than the shaded plants, but the latter had the higher leaf K values. The application of urea markedly increased resistance to *C. caffeicola* in the shaded, but not in the exposed, plants, and significantly increased the dry weight throughout.—Est. exp. agric. Tingo María.

1278. CULOT, J. P.
Symptômes de déficience nutritive du caféier Robusta dans la Cuvette congolaise. **(Symptoms of nutrient deficiency in robusta coffee in the Congo basin.)**
Bull. Inf. I.N.É.A.C., 1959, **8**: 189-99, illus.

Notes and coloured illustrations of N, Mg and K deficiencies.

1279. MULLER, L.
Observación y control de las deficiencias de elementos menores en el cafeto. **(Recognition and control of minor element deficiencies in coffee.)** [English summary 21 lines.]
Turrialba, 1958, **8**: 126-35, bibl. 80, and English version in *Coffee Tea Indust.*, Nov. 1958.

N, P, K, Ca, Mg, S, Fe, Mn, B, Zn, Cu and Mo.

Coffee—diseases and pests.

(*See also* 1267, 1268, 1465.)

1280. SHEFFIELD, F. M. L.
Stem-pitting condition in coffee.
Kenya Coffee, 1959, **24**: 265-6, illus.

Symptoms are described; a virus is suspected.

1281. PICKARD, J. A., AND MARTIN, J. T.
Spray application problems: XLVI. Mercury residues on coffee leaves and berries in relation to the control of berry disease.
A.R. Long Ashton agric. hort. Res. Stat. for 1958, 1959, pp. 88-93, bibl. 4.

Whole berries from coffee trees receiving 13 applications of a fungicidal mercury spray during the period of fruit development showed an average mercury contamination of 1 p.p.m. Much of the mercury present in the berries was located in the seeds. Little of the mercury was lost on roasting the hulled beans. Infusions made from the hulled, roasted and ground beans showed little contamination, most of the mercury being retained by the solid residues. An examination of the mercury deposits on coffee leaves indicated the possibility of the translocation of mercury from sprayed foliage to newly emerging leaves. [Authors' summary.]

1282. SYLVAIN, P. G.
The problem of nematodes in coffee production.
Coffee, Turrialba, [1959], **1**(1): 2-13, bibl. 40.

A review covering their nature and importance, the main types attacking coffee and control measures.

1283. SOMASEKHAR, P.
Nematodes associated with arabica coffee in India.
FAO Plant Prot. Bull., 1959, **7**: 78-9, bibl. 3.

Three predatory, 4 endo-parasitic and 1 free-living species.

1284. ESTEVES, A. B. B.
Método radiológico para determinação do grão furado de café cru. **(Radiological method of determining infestation of fresh coffee beans.)** [English summary ½ p.]
Rev. Café portug., 1959, 6(21): 39-61, bibl. 25, illus.

It is considered that the rate of infestation of fresh Angola coffee beans by *Stephanoderes hampei* should be determined by X-ray photography instead of by the present method of visual inspection, which is inaccurate. An experimental technique is described.

1285. ANANTH, K. C., AND RAMACHANDRAN, P. K.
Tender berry borer.
Indian Coffee, 1959, **23**: 168-9, bibl. 1.

The life history of *Homona coffearia* and the damage caused are described. Thinning and regulation of shade trees in February, followed by spraying with an aqueous 1 : 3,200 solution of Folidol E 605 in June-July, are recommended for control. The Folidol could be combined with the bordeaux spray usually applied at this time.

1286. Sekhar, P. S.
Control of cardamom hairy caterpillars.
Indian Coffee, 1959, **23**: 266-8, bibl. 2.
Folidol, DDT wettable powder or Dieldrex are recommended for use against these caterpillars on coffee and shade trees. DDT and Dieldrex are compatible with bordeaux. The parasitic fungus *Beauveria bassiana* might provide means of biological control.

Coffee—processing and composition.

(*See also* 1281.)

1287. Anon.
Preparation of plantation coffee.
Indian Coffee, 1959, **23**: 320-2.
Short notes on mucilage removal by natural fermentation, fermentation using pectic enzymes, chemical treatment and friction methods.

1288. Boyce, D. S.
The effect of various processing methods on ease of removal of more than half the silver skin from green coffee beans.
J. Agric. Univ. P.R., 1959, **43**: 128-31, bibl. 2.
Natural fermentation combined with artificial (rotary dryer) drying gave the best results.

1289. Lazzarini, W., and de Moraes, F. R. P.
Influência dos grãos deteriorados ("tipo") sôbre a qualidade da "bebida" de café. **(Influence of defective beans on the drinking quality of coffee.)** [English summary ½ p.]
Bragantia, 1958, **17**: 109-18, bibl. 7.
Trials showed that the addition of increasing quantities of defective beans to a sample progressively reduced its drinking quality. The addition of as little as 2·5% of fully defective beans had an adverse effect.

1290. Laíns e Silva, H.
Caracterização física, química e tecnológica dos cafés portugueses. (**Physical, chemical and technological characteristics of Portuguese coffees.**)
Rev. Café portug., 1959, **6**(21): 5-9, bibl. 14.
A discussion without data.

1291. Oliveira, A. dos S.
Cinco estudos sobre café. I. O ácido clorogénio em alguns cafés portugueses crus e torrados. (**Five studies on coffee. I. The chlorogenic acid content of some fresh and roasted Portuguese coffee beans.**)
Rev. Café portug., 1959, **6**(21): 62-8, bibl. 12.
Spectrophotometric analyses showed that the average contents, expressed as % dry matter, of chlorogenic acid in *Coffea arabica*, *C. canephora*, *C. liberica* and *C. racemosa* respectively were 7·07, 8·82, 8·12 and 6·04 in fresh beans and 3·68, 6·81, 5·01 and 3·81 in beans roasted at 250° C.

Guavas.

1292. Gopalkrishna, N., and Khanduja, S. D.
Lucknow 49, a promising variety of guava for western India.
Poona agric. Coll. Mag., 1959, **49**: 251-3, bibl. 4.
This variety has large, greenish yellow, spherical fruit with white flesh. Yields of 8–14 tons per acre are mentioned.

1293. Blommaert, K. L. J.
Propagate guavas by means of leaf-bud cuttings.
Fmg S. Afr., 1959, **35**(5): 29, 32, illus.
Leaf cuttings of guava taken with an axillary bud and a portion of the stem showed 80% rooting under mist after IBA treatment (4,000 p.p.m.).—W.P. Fruit Res. Stat., Stellenbosch.

1294. Siddiqui, M. K. R., and Farooqui, M. A.
Vitamin C potency and food value of guava.
Pakist. J. sci. Res., 1959, **11**: 29-32, bibl. 9, from *Trop. Abstr.*, 1959, **14**, Abstr. g2783.
The average quantity of ascorbic acid per 100 g. fresh fruit amounted to 215 mg.

Mangoes.

(*See also* 1149.)

1295. Choudhury, K. R.
A short note on substitutes for moss as plastering material in air layering of mango.
Sci. and Cult., 1959, **25**: 152-3.
Finely disintegrated rice straw was as good as moss. Sawdust and jute fibre were unsuccessful.—Hort. Res. Stat., Krishnagar, Nadia.

1296. Ledin, R. B.
Can Haden yields be increased by interplanting with Saigon mango?
Proc. 18th annu. Mtg Fla Mango Forum, 1958, pp. 12-14.
Low yields in Haden mangoes have been ascribed to inadequate pollination, but trials over 9 years have failed to show any increase when they were interplanted with the Saigon variety.—Sub-trop. Exp. Stat., Homestead, Fla.

1297. Ullah, M. H.
Ringing of non-bearing mango trees.
Punjab Fruit J., 1958/1959, **22**(78): 8-10.
Removal of a complete ring of bark, 0·5 cm. wide, on main stem or limbs to promote bearing.

1298. Frossard, P.
Présence de *Cercospora mangiferae* Koorders sur la côte d'Afrique. **(The presence of *Cercospora mangiferae* on the African coast.)**
Fruits d'Outre Mer, 1959, **14**: 182-4, bibl. 2, illus.

This mango disease has spread to French Guinea, Cameroun and the Ivory Coast. At present it is controlled to some extent by copper fungicides, but oil sprays, which have given excellent results against banana cercosporiosis, are being tested on infected mango trees.

1299. Viennot-Bourgin, G., and Comelli, A.
Le cercospora du manguier au Congo. (*Cercospora mangiferae* Koorders.) **(Cercospora disease of mangoes in the French Congo.)**
Fruits d'Outre Mer, 1959, **14**: 267-70, illus.

When fortnightly treatments with copper oxychloride applied to control anthracnose (*Glomerella cingulata*) were unavoidably suspended before harvesting late mango varieties, a severe attack of *Cercospora mangiferae* affected the fruit of the variety Brooks.

1300. Narasimhan, M. J.
Control of mango [inflorescence] malformation disease.
Curr. Sci., 1959, **28**: 254-5, bibl. 1.

The systematic removal each year of infested shoots 1–2 ft. behind the inflorescence has given good control of the mites, *Eriophyes* sp., which cause mango inflorescence malformation.

Oil palms.

(*See also* 1451.)

1301. Hussey, G.
The germination of oil palm seed: experiments with *tenera* nuts and kernels.
J. W. Afr. Inst. Oil Palm Res., 1959, **2**: 331-54, bibl. 14, illus.

The excised embryo was shown to be non-dormant, but nuts and kernels germinate very slowly. Germination may be accelerated by increased oxygen, but this was only effective at temperatures of 35–40° C. [see also *H.A.*, 28: 4106]. The optimum constant temperature was 38–40° C., 42° C. being lethal. Periodically lowering the temperature had a stimulating effect. Germination may also be inhibited by too low or too high a moisture level: the optimum content was found to be about two-thirds of the amount of water required to saturate air-dry nuts. It was also shown that nuts could be germinated without any medium by placing them in containers covered with thin polythene sheeting.

1302. Sparnaaij, L. D., and Gunn, J. S.
The development of transplanting techniques for the oil palm in West Africa.
J. W. Afr. Inst. Oil Palm Res., 1959, **2**: 281-309, bibl. 3, illus.

Although transplanting seedlings with a ball of earth remains the best method, where this is impracticable successful establishment can be achieved with naked-root planting, provided the roots are severed in the nursery about a month before lifting. Best results follow root cutting in 2 stages, half the circumference being cut 6 weeks before planting at about 4 in. from the base of the seedling and the second half 2 weeks later at 6 in. Bare-root transplants should be dipped in a clay slurry and protected by moist grass while in transit. Nitrogenous fertilizers are harmful to newly transplanted seedlings and should not be applied for at least 6 weeks after planting. Recommended planting methods are described, and the behaviour of the root systems after transplanting by different methods are illustrated and discussed.

1303. Kowal, J. M. L., and Tinker, P. B. H.
Soil changes under a plantation established from high secondary forest.
J. W. Afr. Inst. Oil Palm Res., 1959, **2**: 376-89, bibl. 8.

In an experiment with oil palms, in which intercropping was compared with normal weed cover and a leguminous cover, growth and yields were best in the intercropped plots, although soil analyses showed that there was a greater general reduction in soil fertility in these plots. Possible reasons for these results are discussed, and it is suggested that early yield differences in favour of intercropping may be reversed before long as deficiency levels are approached.

1304. Wormer, T. M., and Ochs, R.
Humidité du sol, ouverture des stomates et transpiration du palmier à huile et de l'arachide. **(Soil moisture, stomatal opening and transpiration of oil palms and groundnuts.)**
Oléagineux, 1959, **14**: 571-80, bibl. 15.

Field experiments showed that transpiration of oil palms remained constant at soil moisture values between soil capacity and a certain critical content which varied with climatic conditions, particularly with the evaporating power of the air. With decreasing soil moisture content between the critical value and wilting point transpiration decreased steadily, the final rate being almost zero. Stomatal opening was related in the same way to decreasing soil moisture.—I.R.H.O.

1305. Bull, R. A., and Robertson, J. S.
The problem of "little leaf" of oil palms—a review.
J. W. Afr. Inst. Oil Palm Res., 1959, **2**: 355-75, bibl. 37.

On the basis of the literature reviewed it is suggested that the disease and its associated conditions may be divided into 2 main groups, the hook leaf—little leaf complex, which may be provisionally ascribed to B deficiency, and the spear rot—little leaf complex, the cause of which is unknown.

1306. ROBERTSON, J. S.
Blast disease of the oil palm: its cause, incidence and control in Nigeria.
J. W. Afr. Inst. Oil Palm Res., 1959, **2**: 310-30, bibl. 20, illus.

The blast disease of nursery seedlings is described and attributed to attack by 2 fungi, *Rhizoctonia lamellifera* following the initial attack of a *Pythium* sp. The conditions favouring the disease are described and it is shown that its incidence is inversely correlated with rainfall in the short August/September dry season.

1307. JOHNSTON, A.
Oil palm seedling blight.
Malay. agric. J., 1959, **42**: 14-20, bibl. 4, illus.

The causal organism of this disease, which was first observed in Selangor in 1952 and has since become of economic importance, has been identified as a fungus of the *Curvularia maculans* group. Partial control has been established by the use of fungicides, especially thiram and zineb at 0·2% concentration.

Pineapples.

(*See also* 1211.)

1308. GANDÍA DÍAZ, H., AND SAMUELS, G.
Cultivo y elaboración de la piña en Puerto Rico. (**Pineapple culture and processing in Puerto Rico.**) [English summary 2½ pp.]
Bol. Estac. exp. agric. Río Piedras **145**, 1958, pp. 52, illus.

The principal subjects discussed are varieties (Red Spanish, Smooth Cayenne and Cabezona), soils, propagation, preparation of land, planting, weed control, manuring, pruning, control of diseases and pests, harvesting, storage and processing.

1309. CIBES, H., AND SAMUELS, G.
Mineral-deficiency symptoms displayed by Red Spanish pineapple plants grown under controlled conditions. [Spanish summary 2 pp.]
Tech. Pap. P.R. agric. Exp. Stat. Río Piedras, **25**, 1958, pp. 32, bibl. 9, illus.

Symptoms and effects of deficiency of N, P, K, Ca, Mg, S, Fe, Mn and B were investigated in a nutrient solution experiment. Vegetative growth, fruit yield, fruit-to-crown ratio, fruit maturation period, chemical properties of fruit and juice, yields of slips and suckers, and green-weight yields of whole plants and of their component parts were studied. The visual symptoms of deficiency of the different elements are described and illustrated by coloured photographs of leaves and fruit.

1310. MARTIN-PRÉVEL, P.
Carence en potassium sur ananas en Guinée. (**Potassium deficiency in pineapples in Guinea.**)
Fruits d'Outre Mer, 1959, **14**: 285-9, bibl. 10, illus.

The senescent and, in some cases, also the recently matured, leaves of pineapples growing in K-deficient soil in an exceptionally dry season developed numerous small translucent yellow spots and assumed drooping positions. The younger leaves were unaffected. The application of 15 g. of K_2O per plant completely prevented the appearance of these symptoms, and their incidence on leaves of the susceptible category was reduced from 76·5% to 13·3% by as little as 3·5 g. of K_2O per plant.

1311. TISSEAU, M. A.
La déficience en cuivre et en zinc chez l'ananas: le "crook-neck". (**Deficiency of copper and zinc in pineapples: crook-neck disease.**)
Fruits d'Outre Mer, 1959, **14**: 363-7, illus.

Symptoms are described, and curative measures are given in detail. These involve spraying the leaves with 1% zinc sulphate, using 2,000 l. of solution per ha. and repeating the treatment if necessary, and spraying the soil round the plants with 1·5–2·0% copper sulphate, avoiding the leaves. Soils known to be deficient in Cu and Zn may be supplied before planting with 25–40 kg. of copper sulphate and 25 kg. of zinc sulphate per ha. mixed with the ordinary fertilizer.—I.F.A.C.

1312. PÉREZ-ESCOLAR, M. E.
Further experiments on the control of pineapple gummosis in Puerto Rico. [Spanish summary ¾ p.]
J. Agric. Univ. P.R., 1959, **43**: 116-27, bibl. 4.

Gummosis is caused by the feeding of larvae of a species of *Batrachedra* and is a problem of importance in the variety Red Spanish. Two chemical control experiments are described. Results demonstrated that gummosis can be effectively reduced by spraying with a number of insecticides, but only when this is done at blossoming time. In general, two spray applications were needed to effect control, although, for some of the individual insecticides, comparisons between one and two applications showed no significant differences. Residues were below the established tolerances in the case of 1 and 2 applications of toxaphene and heptachlor, and of 1 application of chlordane.

1313. BEAN, V. C.
Mobile packing shed saves money for pineapple grower.
Qd agric. J., 1959, **85**: 473-6, illus.

Plantation layout, specifications and operation of the shed are given. The completed shed, built on the chassis of a discarded truck, cost £150, and harvesting and packing costs were halved.

1314. Huet, R., and Tisseau, M.-A.
Observations sur l'évolution de l'ananas après la coupe. **(Observations on the development of pineapples after harvesting.)**
Fruits d'Outre Mer, 1959, **14**: 271-4.

Freshly harvested pineapples were stored either at (a) 25° C. with the R.H. ranging daily from 30 to 90%, or (b) at 11° C. with a R.H. of 70 to 90%. Daily determinations were made for 20 days of weight, sugar content and acidity. It was concluded that in a tropical climate pineapples to be stored for more than 10 days must be refrigerated, that at 10–13° C. fruits stored well for 20 days, that fruit for storage should be healthy and unbruised, especially in the case of the varieties Baronne de Rothschild and Smooth Cayenne, and that during cold storage acidity develops as a result of the increase of citric acid, aroma increases and flavour consequently improves.—I.F.A.C., Foulaya.

1315. Conaty, F. N. G.
Some biochemical and technological studies on Malayan pineapple, with particular reference to the Singapore canning variety.
Malay. agric. J., 1959, **42**: 2-13, bibl. 11, illus.

The canning qualities of 4 local varieties are considered, Sarawak being rejected because of its poor flavour and shape and Mauritius on account of its low acidity. Singapore Canning and Selangor Green compare favourably with varieties canned elsewhere. The effects of fruit maturity and of sugar and acidity distribution in the fruit on the quality of the edible matter and the production of pineapple juice concentrate are described. Data on fruit composition are included.

1316. Anon.
Pineapple fibre.
Commonw. Prod., 1959, No. 371, p. 102, from *Trop. Abstr.*, 1959, **14**, Abstr. g2058.

A newly designed decorticator, in use in South Africa, can produce 160 kg. of pineapple leaf fibre daily. This can be mixed with kenaf fibre for hessian production.

Rubber trees.

(*See also* 565.)

1317. Schultes, R. E.
Terrain and rubber plants in the upper Apaporis of Colombia.
Suelos ecuat., 1958, **1**: 121-9, from *Trop. Abstr.*, 1959, **14**, Abstr. g2775.

This article contains a description of this basin and an inventory of the main latex-bearing trees, *Hevea guianensis, H. guianensis* var. *lutea, H. nitida, Castilloa ulei, Manilkara* spp. and *Cauma macrocarpa*.

1318. Rubber Research Institute of Malaya.
Annual Report, 1956, pp. 79, $3 (Malayan).

Soils division: On averaging the results of 17 manurial trials it was found that all 3 major plant nutrients are probably required to give maximum yields. Young replants made better growth when ground cover was controlled by strip weeding than by circle weeding. Mulching had a beneficial effect in both cases and in other experiments. Lalang was successfully controlled by Dowpon at 10 lb. in 100 gal. per acre. Bark analysis gave as good an indication of the nutrient status of the tree as leaf analysis. In sand culture traces of Co improved root development, though its absence did not produce deficiency symptoms. A favourable balance between molybdate, sulphate and Ca ions was necessary to maintain seedling vigour. Seedlings grown in the dark showed no decrease in the concentration of rubber. Susceptibility to bird's eye spot (*Helminthosporium heveae*) disease appeared to increase with the supply of N. *Botanical division:* Trials of clones and tapping systems. *Pathological division:* Stump poisoning with sodium arsenite and 2,4,5-T is being studied. Termites were effectively controlled by soil applications of dieldrin and aldrin. *Chemical division:* Investigation of micro-organisms in latex. [This report was previously published in an abridged form, see *H.A.*, 28: 4116.]

1319. Tollenaar, D.
Rubber growing in Brazil in view of the difficulties caused by South American leaf blight *(Dothidella ulei)*.
Neth. J. agric. Sci., 1959, **7**: 173-89, bibl. 20, illus.

In an attempt to avoid blight infection, blight-resistant crowns were top-budded on high-yielding Eastern clones; this method, however, proved impracticable, because the crown buddings used depressed the yields of the Eastern panel clones, and there was also a high percentage of failures after transplanting. Results were more satisfactory with single-budded trees, when the highest-yielding resistant clones were used. In establishing rubber plantations in Brazil the author recommends that material be chosen from highly resistant clones (of relatively unknown performance), from high-yielding Eastern clones which are tolerant, or from seedlings of selfed PB86 and AV1301, both of which show some leaf blight resistance.

1320. Anon.
Transplanting stumped buddings.
Plant. Bull. R.R.I.M., 1959, No. 44, pp. 116-19, illus.

Method described and illustrated.

1321. ANON.
Assessment of the growth of Clone RRIM 501.
Plant. Bull. R.R.I.M., 1959, No. 43, pp. 78-9.

Girth measurements taken 60 in. above the union are given, from which the vigour of growth of this clone can be determined at 2 to 5 years after budding. Less than 5 in. at 2 years is classed as very slow; over 21 in. at 5 years is outstanding.

1322. ANON.
Wind damage.
Plant. Bull. R.R.I.M., 1959, No. 43, pp. 79-93, illus.

The prevalence of high winds in the rubber growing areas of Malaya is shown by histograms, from which it appears that the coasts of Malacca, Negri Sembilan and Selangor are the regions most affected. Various weaknesses in tree structure leading to injury by high winds are described. The tendency of RRIM 501 and 614 to incur trunk snap is attributed to their being tapped at too early a stage and thereby suffering a partial arrest of girth development. Removal of branches springing at an acute angle to the trunk, and thinning to produce a balanced crown are recommended, as are the postponement of tapping and the avoidance of wide avenues and hedge systems of planting.

1323. ANON.
Ladder tapping of budded trees: height of opening.
Plant. Bull. R.R.I.M., 1959, No. 43, pp. 93-4.

An experiment with mature trees indicated that when ladder tapping is necessary the cut should be opened as high as possible to avoid a downward trend in yields. It is suggested that the tree be given a stimulant when the cut approaches the junction of virgin and renewed bark. In this experiment the trees were opened at 110 in. and a bark consumption of 12 in. per year was found possible.

1324. DE SILVA, C. A.
A note on the "grooming" of rubber trees.
Quart. J. Rubb. Res. Inst. Ceylon, 1959, **35**: 16-17, illus.

How and when to remove lichens and mosses without damaging the trees.

1325. RIGGENBACH, A.
Antimucin—a new water miscible fungicide for the control of black stripe.
Quart. J. Rubb. Res. Inst. Ceylon, 1959, **35**: 8-9, illus.

Brushing and spraying the affected parts with Antimucin at concentrations of 1 in 160–320 was the most effective treatment for the control of *Phytophthora palmivora* in Ceylon. Tillex was equally effective but less suitable for use on tapping panels.

1326. ANON.
Approved fungicides for mouldy rot control.
Plant. Bull. R.R.I.M., 1959, No. 44, p. 121.

Nine tar acid commercial formulations and 5 other proprietary fungicides with recommended concentrations are tabulated.

1327. ANON.
Checking the spread of root disease.
Plant. Bull. R.R.I.M., 1959, No. 43, pp. 95-6.

Recent work has confirmed that creosoting and poisoning the stumps of felled trees with sodium arsenite or 2,4,5-T greatly reduces the incidence of root disease among the replants.

1328. D'AUZAC, J., AND PUJARNISCLE, S.
Sur les différentes formes de phosphore présentes dans le latex d'hévéa. **(On the different forms of phosphorus found in hevea latex.)** [English, German, Spanish and Italian summaries $\frac{1}{2}$ p. each.]
Rev. gén. Caoutch., 1959, **36**: 862-70, bibl. 17.

The author distinguishes total P, mineral P, glucidic P, lipoid P and protein P. Some 50–80% of the total is mineral P. Increased mineral P, such as results from stimulation, favours bacterial action and reduces the stability of the latex. Stimulation can thus have a secondary effect adversely affecting output. The surface-active lipoid P, however, increases stability and counteracts the effect of mineral P. It is suggested that the ratio lipoid P/mineral P for latex having a Mg/P ratio of less than unity may be used to express stability, the simple Mg/P ratio being insufficiently precise.

1329. MOIR, G. F. J.
Ultracentrifugation and staining of hevea latex.
Nature, 1959, **184**: 1626-8, bibl. 14, illus.

The appearance and staining reaction of 10 zones, into which latex separated on centrifuging at 53,260 *g*.

Sugar cane—general.

1330. U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
Increase in world sugar production exceeds expectations.
Foreign Agric. Circ. U.S. Dep. Agric. **FS 2-59**, 1959, pp. 9.

World production for the 1958-59 season is now estimated at 55·2 million short tons, 10% above the previous year's record.

1331. LOWNDES, W. G.
Sugarcane in New South Wales.
World Crops, 1959, **11**: 170-2, 223-5, 256-8, illus.

With details of legume green manures and land preparation.

1332. INDIAN CENTRAL SUGARCANE COMMITTEE.
Sugarcane research in India: 1929-1954——a review. I. Sugarcane agronomy and physiology. II. Sugarcane botany and breeding; soils. III. Sugarcane chemistry, gur and khandsari. IV. Sugarcane entomology and mycology. V. Statistics and conclusions.
Indian J. Sugarcane Res., 1958, **2**: 211-27, bibls 67 and 121; 1958, **3**: 43-57, bibls 65 and 30; 1959, **3**: 109-22, bibls 72 and 58; 161-86, bibls 151 and 128; 239-47, bibl. 29.

Sugar cane—breeding and varieties.

(*See also* 1356, 1367, 1465.)

1333. BARBADOS.
Twenty-fourth Annual Report of the British West Indies Central Sugar Cane Breeding Station for the year ending September 30th, 1957, pp. 46.

A mixture of old, weathered filter-press mud and soil (1 : 3) proved superior to other media for raising sugar cane seedlings. Preliminary experiments on the effect of hot-water treatment of cuttings suggest that arrowing is greatly intensified. In the third-year seedling plant cane trials only one variety, B.53200, was worthy of mention, and that only on heavy soils. In the third-year first ratoon trials several varieties outyielded the standards, B.52298 being the most promising. B.5213 has also performed well, particularly in the low rainfall areas, where it has given very heavy plant and ratoon yields. In contrast, B.52107 produced quite good plant and ratoon yields in the high rainfall areas. In the select seedling plant cane trials B.4744 was outstanding, significantly outyielding the other varieties. The distribution and performance of varieties in other territories are also discussed.

1334. PANJE, R. R., AND SRINIVASAN, K.
Studies in *Saccharum spontaneum*. The flowering behavior of latitudinally displaced populations.
Bot. Gaz., 1959, **120**: 193-202, bibl. 8.

With reference to possible applications in sugarcane hybridization, especially as an aid to reducing the excessive flowering tendency of the hybrids.—Sugarcane Breed. Inst., Coimbatore.

1335. BIRKETT, L. S., AND CAMERON, C.
Field experiments with sugar cane, XXVII. 1. Variety trials, 1958.
Sugar Bull. Brit. Guiana Dep. Agric., 1959, No. 27, pp. 2-52.

B.41227 and B.37161 remain the best standard varieties. Their nearest rivals are B.49119, which is susceptible to leaf scald, B 47258, which although a heavy yielder is much attacked by rats and aphids, and D.141/46 which is primarily an autumn crop cane.

1336. YOUNG, H. E.
Varietal trials—1958 season.
Cane Grs' quart. Bull., 1959, **22**: 138-43.

Reports of 9 Queensland trials.

1337. VOLP, P.
Q.66 in the Mulgrave area.
Cane Grs' quart. Bull., 1959, **23**: 21.

Although rather susceptible to disease, its erect anti-lodging habit, quick germination, rapid growth and high sucrose content make Q.66 a valuable new variety.

1338. STORY, C. G.
Q.68.
Cane Grs' quart. Bull., 1959, **23**: 10-12, illus.

The appearance and performance are described of this disease resistant variety, which was selected from seedlings of a P.O.J.2878 × Co.290 cross. It does well on the poorer soils, ratoons strongly and produces good crops in both first and second ratoons.

1339. SEGALLA, A. L., AND ALVAREZ, R.
Variedades de cana-de-açúcar. II.—Série de ensaios realizados no período 1953-1956. **(Sugar cane varieties. II. 1953-1956 trials.)** [English summary $\frac{3}{4}$ p.]
Bragantia, 1958, **17**: 45-79, bibl. 3.

Twelve CB. and 4 Co. varieties were compared at 6 localities in São Paulo State. CB. 40/69, CB. 41/76 and Co. 419 are recommended for planting on all soils throughout the State. Other high-yielding varieties suitable for specified localities are CB. 40/19, CB. 38/22 and CB. 41/70. [For part I, 1951–1954, see *H.A.*, 27: 3964.]

1340. RAHEJA, P. C.
Performance of sugarcane varieties in relation to ecological habitat.
Indian J. Sugarcane Res., 1959, **3**: 127-30, bibl. 7.

Tables are given showing the relative efficiency of water usage, foliage : root ratios, relative transpiration ratios and the respiration of roots and shoots in different seasons of 10 cane varieties. From these tables varieties edaphically suitable for different areas in India can be chosen.—Indian agric. Res. Inst., New Delhi.

1341. MUKHERJI, N., AND ALAM, M.
Roots as indicators to varietal behaviour under different conditions.
Indian J. Sugarcane Res., 1959, **3**: 131-4, bibl. 10, illus.

The root development of Co.453, Co.313 and Co.K.41 was examined under high (200 lb. N per acre) and moderate (100 lb.) nitrogenous manuring. The root systems showed varietal differences, an early maturing variety having more long horizontal roots and one with a lodging habit having a shallower root system. Doubling the N dosage increased the number of active roots and the horizontal spread of the root system. The environment also affected root systems, hard subsoils, for instance, confining the major roots to the upper levels of the soil.—Indian Inst. Sugarcane Res., Lucknow.

1342. Khanna, K. L., Sharma, S. L., and Shrivastava, R. C.
Outstanding canes of Bihar: III—B.O.11; a high-sucrose cane; IV—B.O.14.
Indian J. Sugarcane Res., 1959, **3**: 33-9, bibl. 8, illus., and 141-7, bibl. 5, illus.
Botanical descriptions, with notes on performance.

1343. Obaidullah Jan.
Results of sugarcane varietal trials in the Peshawar valley.
Agric. Pakist., 1958, **9**: 343-56, bibl. 3.
The results are given in detail of 4 plant and 3 ratoon trials, which have provided information on the yielding capacity and other characteristics of Co.292, Co.622, Cos.245 and Cos.321. All four varieties have yielded well. The Cos. varieties gave the highest yields but possess some undesirable characteristics. [For earlier results see *H.A.*, 28: 912.]

1344. du Toit, J. L.
Annual summary of agricultural data for the [South African] sugarcane crop, 1955-56.
Proc. 32nd annu. Congr. S. Afr. Sugar Tech., 1958, pp. 28-36.
N:Co.310 occupied 55·4% of the area under plant cane in April 1956 and yielded 39·4 tons cane per acre, while the newer N:Co.339 appeared in the lists for the first time with 10·1% of this area and yielded 43·9 tons per acre.

1345. Sheffield, F. M. L.
Sugar cane importation.
E. Afr. agric. J., 1959, **25**: 16-17, bibl. 2.
Lists of varieties available in East Africa after quarantine.

Sugar cane—planting and cultivation.

(*See also* 1391.)

1346. Pearson, C. H. O.
Monoculture of sugarcane. Experimental evidence showing that the time taken in growing a green manure crop can be turned to a profit by following cane after cane in a rotation.
Proc. 32nd annu. Congr. S. Afr. Sugar Tech., 1958, p. 143.
In this experiment 3 methods of treating land after a cane crop were compared, viz. 6 months' green manuring with sunnhemp; 6 months' green manuring followed by 6 months' bare fallow; and replanting cane without delay but with a dressing of 200 lb. sulphate of ammonia per acre. The third method outyielded the other two by more than 20 tons per acre for the combined plant and 1st ratoon crops.

1347. Jeansonne, R. J.
Sod-crop rotation on sugar cane lands.
Sugar. J., 1959, **21**(12): 21-2.
Rotation of 3–4 years under grass and/or legumes with 3-4 years under cane recommended to conserve soil and water.

1348. Tang, K. H., and Ho, F. W.
The effect of subsoiling on the yield of cane in Taiwan. [Chinese, with English summary ⅓ p.]
Rep. Taiwan Sugar Exp. Stat., 1958, No. 17, pp. 1-6, bibl. 16.
No significant responses to subsoiling to a depth of 18 in. were obtained over 3 years in 8 field experiments using varieties F.134 and N:Co.310.

1349. Aziz, H.
Farm soil as water storage reservoir for sugar-cane.
Agric. Pakist., 1958, **9**: 322-7, bibl. 3.
Of the total water requirements of 60 acre-in. for sugar cane, it was found that the Lyallpur soil would hold 12 in., which could be applied 2 months before planting, thus reducing the water needs during the season and releasing the balance for other crops.—Govt. Seed Fm, Lyallpur.

1350. Fu, H. C.
An improved method of cultivating autumn paddy sugar cane in Taiwan. [Chinese, with English summary 3½ pp.]
Rep. Taiwan Sugar Exp. Stat., 1958, No. 17, pp. 7-28, bibl. 9, illus.
Five older methods of growing sugar cane interplanted with rice are summarized, and a sixth improved method, developed by the author, is recommended. Cuttings with 2 nodes are planted obliquely in the autumn rice crop with one node below the surface. Before the rice harvest these cuttings are trodden down, pressing the top node onto the soil. Labour requirements are small, and flooding after planting does not affect germination.

1351. Pearson, C. H. O.
Space planting of sugar cane in relation to soil moisture.
Proc. 32nd annu. Congr. S. Afr. Sugar Tech., 1958, pp. 99-103.
The results obtained in the first stages of a long-term experiment on row widths and spacing distances appeared to show that variations in these factors had little effect on yield. Later work with sprinkler irrigated cane, however, produced the expected fall in yield with reduced populations, thus indicating that soil moisture was the limiting factor in the earlier experiments.

1352. Birkett, L. S., and Cameron, C.
Field experiments with sugar cane, XXVII. 4. Cultivation experiments.
Sugar Bull. Brit. Guiana Dep. Agric., 1959, No. 27, pp. 71-6.

As in the plant cane crop [see *H.A.*, 29: 924], both the yield and quality of first ratoon cane were higher with the Cameron-Williams cultivation method than with normal estate practice.

1353. Anon.
New machine for cultivating young cane.
S. Afr. Sugar J., 1959, **43**: 631.

The Moyle rocking rakes plus an attachment for working ratoons.

Sugar cane—nutrition.

(*See also* 1211, 1341.)

1354. Subramanian, T. R.
A note on the third leaf in sugarcane as an indicator of nutrient status and yield of the crop.
Madras agric. J., 1959, **45**: 411-14, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 31,052.

The green leaf sheath does not seem to reflect N, P and K fertilizer treatment as clearly as the third leaf. In the variety Co. 527 the yield of sugar per acre was linearly related to the N content of the third leaf.

1355. Lintner, J.
Random block and quasi-latin square designs used to determine fertilizer requirements of sugarcane.
Proc. 32nd annu. Congr. S. Afr. Sugar Tech., 1958, pp. 120-42, bibl. 8.

Five fertilizer and 5 fertilizer-cum-variety trials described and their results analysed.

1356. Birkett, L. S., and Cameron, C.
Field experiments with sugarcane, XXVII. 3. Fertilizer experiments, 1958.
Sugar Bull. Brit. Guiana Dep. Agric., 1959, No. 27, pp. 61-9.

Liming experiments: Limestone applications caused small yield increases and also increased P in the juice. There was a tendency to increase P and K in the leaf also. *Relative values of various phosphate fertilizers:* Yield increases due to P were insignificant, but the P content of juice and cane was increased. There were no significant differences due to the source of P. *Variety-fertilizer experiments:* Varietal responses are described. In general, 71 lb. N per acre (=3 cwt. sulphate of ammonia) was the maximum economic dressing for plant cane; twice this dressing on the first and second ratoons was economic, but for maximum yields still higher rates would be needed.

1357. Owen, W. L.
Filter press muds and bagasse—valuable organic fertilizers.
Sugar J., 1959, **23**(2): 18-21, bibl. 18, illus.

A review.

1358. Farooque, M. P., and Srivastava, S. P.
A study of the effects of bulky organic manure and chemical fertilizer treatments of cane on gur quality.
Indian J. Sugarcane Res., 1958, **2**: 197-8, bibl. 2.

The treatments given were: no manure; compost with superphosphate; ammonium sulphate with superphosphate; and all three manures. Gur made from the cane on manured plots showed a significant fall in colour intensity but no other appreciable differences.—Sugarcane Res. Inst., Pusa.

1359. Farooque, M. P., and Srivastava, S. P.
Effect of organic and inorganic fertilization of sugarcane on quality of gur.
Indian J. Sugarcane Res., 1959, **3**: 153-5, bibl. 3.

In field trials 2 levels of N + P were used, in which a number of organic and inorganic forms of N were compared. No significant differences in the clarification, colour or composition of the juice were observed resulting from differences in the level or form of fertilizer used.—Sugarcane Res. Inst., Pusa.

1360. Landrau, P., Jr., Samuels, G., and Alers-Alers, S.
The response of two sugarcane varieties to fertilizers at Río Piedras, 1954-57. [Spanish summary 1 p.]
J. Agric. Univ. P.R., 1959, **43**: 73-88, bibl. 13.

The leading varieties, B.41227 and M.336, showed significant sugar yield responses to N at 150 lb. per acre in all experiments and at 300 lb. in some. P caused no significant responses with one exception, and the response to K was erratic. There was a highly significant linear correlation between relative yield of sugar and % leaf N for both varieties.

1361. Alvarez, R., Segalla, A. L., and Catani, R. A.
Adubação da cana-de-açúcar. III. Fertilizantes nitrogenados. (**Sugar cane fertilization. III. Nitrogenous fertilizers.**) [English summary $\frac{1}{2}$ p.]
Alvarez, R., and others.
Adubação da cana-de-açúcar. IV. Fertilizantes fosfatados. (**Sugar cane fertilization. IV. Phosphatic fertilizers.**) [English summary $\frac{2}{3}$ p.]
Bragantia, 1958, **17**: 141-6, bib. 4, and 355-62, bibl. 6.

When compared at 75 kg. N per ha., in the presence of P and K, castor meal, Chilean nitrate, sulphate of ammonia, calcium nitrate and urea gave equivalent results and were superior to calcium cyanamide. The yields given by the N fertilizers ranged from 91·4 tons per ha. with calcium nitrate to 82·3 with cyanamide. Those of the PK treatment and the control were 81·2 and 70·1 respectively. In the second paper an experiment is described in which 7 artificial and mineral P fertilizers were compared at 100 kg. P_2O_5 per ha. in the presence of N and K on plant cane of Co.290 in 2 localities. All gave positive responses, but there were no significant differences between the yield increases obtained. [For parts I and II see *H.A.*, 29: 931.]

1362. VALLANCE, L. G.
Nitrogen—from a green manure crop.
Cane Grs' quart. Bull., 1959, **23**: 26.

A green manure mixture of Reeves cowpea and velvet bean gave increased yields of cane and sugar greater than those produced by 3 cwt. of ammonium sulphate per acre. The addition of sulphate of ammonia to the green manure had no significant effect.

1363. OBAIDULLAH JAN.
Studies on the relative efficiency of some nitrogenous fertilizers on the yield of sugarcane.
Agric. Pakist., 1958, **9**: 357-9, bibl. 3.

In trials at the Sugarcane Research Station, Mardan, ammonium sulphate nitrate proved a significantly better source of N than ammonium sulphate, calcium ammonium sulphate or urea in trials comprising 2 plant and 3 ratoon crops.

1364. ZENDE, G. K., AND KALBHOR, P. N.
On the mobility of nitrate nitrogen in the soil when applied in the form of fertilizers 4 inches deep.
Indian J. Sugarcane Res., 1959, **3**: 1-9, bibl. 29.

Eight forms of N compared.

Sugar cane—climate, growth and composition.

(*See also* 1341.)

1365. GILL, H. S., AND SINGH, H.
Pith development in sugarcane as influenced by hot weather irrigations.
Indian J. Sugarcane Res., 1959, **3**: 148-50, bibl. 6.

The influence of 1 to 6 irrigations on pith development was studied in 6 varieties. While pithiness proved to be primarily a varietal characteristic, drought increased it and adequate moisture reduced it. Co. 312 produced little pith even under unfavourable conditions, whereas Co. 453 and 285 responded markedly to irrigation. High temperatures and low humidities also favoured pith formation.—Sugar Res. Stat., Jullundur, Punjab.

1366. SWAN, A. D.
The effects of cyclones on the sugar crop in Mauritius.
Rev. agric. sucr. Maurice, 1959, **38**: 172-3.

Confirming earlier results [see *H.A.*, 28: 1999k].

1367. BIRKETT, L. S., CAMERON, C., AND GOMES, H.
Field experiments with sugar cane, XXVII. 2. Growth and ripening studies of the cane varieties B.41227, B.37161, D.158/41 and D.37/45. IV. Third ratoon cycle.
Sugar Bull. Brit. Guiana Dep. Agric., 1959, No. 27, pp. 53-60.

In addition to confirming conclusions outlined in the previous report [see *H.A.*, 29: 933] and descriptions of the behaviour of the individual varieties given here, other aspects revealed by the studies are as follows: *Arrowing:* If normal ripening weather prevails, arrowed canes continue to increase in sucrose content for a considerable time without weight loss. In wet weather deterioration normally occurs. *Peaks on yield curves:* In a 2-peak yield curve the first peak occurs at arrowing at 9–12 months, followed by a period—particularly in heavy rains—of rapid growth of secondary immature stalks at the expense of the mature. Eventually a second peak rises representing the maturity of most of the secondary stalks. Under the climatic conditions of British Guiana it is probably unwise economically to await the second yield peak as quality falls and transport and processing costs are increased. *Relationship between pol. % cane and yield:* There is a close relationship up to the first yield peak.

1368. PANJE, R. R., AND PRASAD, P. R. J.
Effects of ionising radiation on sugarcane buds.
Curr. Sci., 1959, **28**: 204-5, bibl. 8.

Dosages ranging from 10 to 4,800r were given from a Co^{60} source. The main effect was on growth; in general, a period of restricted growth was induced, occurring at the earliest stages under the higher dosages. There was a wide difference in growth between buds given 10–800r and those treated with 1,200–4,800r. The lethal dose was around 14,000r.—Sugarcane Breed. Inst., Coimbatore.

1369. VILAREAL, E. P., AND SANTOS, O.
Test on the effect of Gibrel upon the growth and yield of sugar cane. Preliminary account.
Sugar News, 1959, **35**: 165-7, bibl. 5.

Gibrel (potassium gibberellate) at dosages of 20, 40 and 100 p.p.m. was sprayed twice on to cane at 90 and 125 days after planting. The main effects were increases in the rate of growth and elongation of the internodes. Compared with the controls these increases became marked at 57 days after the first application and 20 days after the second, and were greatest with the dosage of

40 p.p.m. The difference in height between the controls and the treated stools continued to increase until harvest time. No effect on tillering could be observed. A tendency to lower the yield of cane and sugar was not statistically significant.—Philipp. Sugar Inst.

1370. ARAVAMUDHAN, P.
More sugar per acre through a new chemical.
Indian Sugar, 1959, **9**: 85-6, bibl. 1.

Mill trials 7 and 14 days after spraying unirrigated Bo. 32 cane with 1 oz. Terpineol plus 1 lb. Albolineum as adhesive per 100 gal. water per acre showed a mean increase in sugar % cane of 0·5, representing a 4% increase in sugar recovery.

1371. PARTHASARATHI, K., AND VIJAYASARADHY, M.
Biochemical studies of photoperiodism in sugarcane. I. Sugars and their fluctuation during the vegetative and reproductive condition of the cane plant.
Indian J. Sugarcane Res., 1959, **3**: 135-40, bibl. 19.

Setts of the early flowering variety Co. 285 were planted on February 5 and grown normally until June 10, when one group was given 4 hr. extra light per day, and another group 4 hr. less light per day. From September 15 the plants which had received extra light were switched to the shorter light regime. Apart from the expected effect on flower initiation, the alteration in light regime affected both the reducing sugars and sucrose contents of stems and leaves. Whereas, however, both treatments increased the reducing sugars content of the stems, the extra light reduced the sucrose content appreciably and the extra darkness greatly increased it.—Sugar Breeding Inst., Coimbatore.

1372. DURAIRAJ, D. J.
Study of total solids–sucrose relationship in sugarcane juice with reference to varieties.
Madras agric. J., 1958, **45**: 377-91, illus., from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 31,334.

In 23 out of 24 varieties of sugar cane there was shown to be a relationship between sucrose content and content of total sap solids (Brix). The regression coefficient was numerically equal to the tangent of an angle subtended by a regression line to the horizontal. The regression coefficient was related to the date of maturation. A method is described by which it is possible to determine the degree of earliness of plants when they are only half grown.

Sugar cane—diseases.

(*See also* 1484.)

1373. ADSUAR, J.
Present status of sugarcane disease studies in Puerto Rico.
Sugar J., 1959, **22**(1): 51-2.

The incidence of mosaic is falling owing to the reduction in the acreage planted of the susceptible variety B.34104. Chlorotic streak can be held in check by immersing the setts in water at 52° C. for 20 min. before planting. Ratoon stunting is prevalent, but can be controlled by hot-water (50° C. for 2 hrs.) or hot-air (58° C. for 8 hrs.) treatment of setts, and work proceeds to find a rapid diagnostic technique.

1374. THOMSON, G. M.
Sugarcane disease testing methods in Natal.
Proc. 32nd annu. Congr. S. Afr. Sugar Tech., 1958, pp. 104-11, bibl. 1.

Schemes for gumming disease, smut, red rot, mosaic, streak and ratoon stunting disease susceptibility trials.

1375. DANTAS, B.
Uma nova doença da cana de açúcar em Pernambuco. (**A new disease of sugarcane in Pernambuco.**) [English summary.]
Bol. téc. Inst. Agron. Nordeste, 1956, **4**: 3-17, illus., from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 35,256.

A preliminary study of a new disease of sugar cane in Pernambuco, Brazil, was first reported in July, 1954, and tentatively named foliar yellow stripe disease. Symptoms resemble leaf scald, but more closely simulate chlorotic streak, a disease not yet reported in Brazil. Complete cure by hot-water treatment (52° C. for 20 minutes) and its imperfect systemic distribution are 2 characters common to both chlorotic streak and the new disease. Transmission by diseased setts was experimentally demonstrated, but another means of transmission is indicated by the high percentage of natural infection of seedlings bred at this station. The commercial varieties P.O.J. 2878 and C.P. 27-139 are very susceptible, but Co. 290 has not been reported diseased. Co. 331, Co. 419 and Co. 421, now coming into commercial cultivation, have shown some cases of infection.

1376. CHU, H. T., LIEE, S. M., AND LIEE, C. Y.
Sampling technique for estimating the percentage of infection of sugarcane stunting disease. [Chinese, with English summary 1 p.]
Rep. Taiwan Sugar Exp. Stat., 1958, No. 17, pp. 29-38, bibl. 3.

Twenty randomly selected plots per ha., each of 2 rows of 10 plants, were required. For ½-ha. fields 10 plots of single rows of 10 plants were sufficient. It is suggested, therefore, that areas of 1 ha. should be treated as two ½-ha. fields.

1377. STEIB, R. J., AND CHILTON, S. J. P.
The hot-air oven can control ratoon stunting disease.
Sugar J., 1959, **21**(12): 19-21, illus.

A commercially available hot-air oven capable of holding a ton of setts is described with instructions for its use.

1378. BRITISH GUIANA DEPARTMENT OF AGRICULTURE.
Leaf scald ratings of sugar cane varieties in British Guiana.
Sugar Bull. Brit. Guiana Dep. Agric., 1959, No. 27, p. 89.

1379. CHU, H. T., AND TSAI, T. K.
Study of leaf scorch of sugar cane. Part IV. Results of spore trapping. [Chinese, with English summary 8 lines.]
Rep. Taiwan Sugar Exp. Stat., 1958, No. 17, pp. 39-43, bibl. 6.

Results show that *Stagonospora sacchari* can be disseminated by wind.

1380. ALBUQUERQUE, M. J., AND ARAKERI, H. R.
Sugarcane rust in Bombay State.
Indian J. Sugarcane Res., 1958, **2**: 199-203, bibl. 3.

The results of susceptibility tests on 23 varieties are reported and suggest the existence of physiological races of *Puccinia kuehnii*.—Sugarcane Res. Stat., Padegaon, Bombay.

1381. ROBINSON, R. A.
Sugar cane smut.
E. Afr. agric. J., 1959, **24**: 240-3, bibl. 18, illus.

The disease, caused by *Ustilago scitaminea*, has now become established in Kenya. Control methods are discussed, including plant quarantine, destruction of smutted cane, clean planting material, rotations and the use of resistant varieties. Infected setts can be disinfected by soaking in hot water at 52° C. for 18 min. A list of varieties with their susceptibility is given.

Sugar cane—pests.

1382. MARTORELL, L. F.
Control of the important sugarcane insect pests in Puerto Rico.
Sugar J., 1959, **22**(1): 55-63, bibl. 11, illus.

The most important pests of sugar cane in Puerto Rico are *Diatraea saccharalis*, against which a spray of 8 oz. technical endrin in 60–70 gal. water per acre is recommended, and the grubs of *Phyllophaga portoricensis* and *P. vandenii*, which can be controlled by soil disinfestation with BHC or aldrin at 2 lb. per acre. Of lesser, but still considerable, importance are the weevil *Diaprepes abbreviatus*, also controlled by soil applications of BHC and aldrin, and the aphid *Sipha flava*, which is destroyed by malathion sprays at 1 pint of 57% emulsion in 3 gal. per acre.—Univ. P.R., Río Piedras.

1383. AGARWAL, R. A., AND RAMANUJAM, K. R.
Some insect pests of sugarcane seedlings raised from fluff at Coimbatore.
Indian Sugar, 1959, **9**: 83-4, bibl. 2, illus.

Several pests are described: recommended control measures are mixing 5 to 7 lb. per acre of BHC or chlordane dust with the soil before sowing and passing a muslin cloth wetted in 0·1% endrin emulsion over the seedlings, which would be scorched by normal spraying.

1384. DANTAS, B., PEREIRA DA SILVA, A., AND QUERIOZ, G.
A germinação das estacas da cana de açucar, em face do tratamento pelos modernos inseticidas orgânicos clorados. **(Germination of sugarcane setts following treatment with modern organic polychloric insecticides.)** [English summary.]
Bol. téc. Inst. Agron. Nordeste, 1956, **4**: 47-58, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 35,227.

The effect of insecticides was studied by dipping setts for 2 minutes in wettable powders and emulsions, and by dusting dry powders on them in the furrows. Toxaphene 72%, used as 1% active-ingredient emulsion, produced the highest stands. Wettable powders of toxaphene, chlordane and lindane, as 1% a.i. suspensions, also produced better stands than the controls. Wettable aldrin, as 0·35% a.i. suspension, was less effective. As a group, wettable powders produced significantly better stands than dry powders.

1385. MATTHEWS, A. A.
Insecticide experiments against wireworms.
Cane Grs' quart. Bull., 1959, **23**: 6-8.

BHC 20% at 10 lb., lindane at 4⅙ oz., and aldrin 2½% at 10 lb. 6⅖ oz. per acre applied both with the setts and separated by an inch of soil were tried in replicated trials. Germination was delayed somewhat by the direct application, but in all cases the final germination was significantly higher than in the control, the increase being in the region of 100% in the second trial.

1386. FRESHWATER, I. T.
Use BHC fertilizer mixtures with care.
Cane Grs' quart. Bull., 1959, **22**: 130-1, illus.

When the mixture, applied in the drill for wireworm control, comes into direct contact with the setts, the developing roots are suppressed and become club-shaped.

1387. SMITH, N. M.
Insecticidal trials in the Bundaberg-Isis areas.
Cane Grs' quart. Bull., 1959, **23**: 33-5, illus.

The insects mainly responsible for damage in these areas are the larvae of the beetles *Lepidiota trichosterna* and *Pseudoholophylla furfuracea*. Since 1955 240 observation plots and 9 replicated trials have been instituted, comparing various levels, formulations and methods of application of BHC, aldrin, dieldrin and chlordane. Some phytotoxicity has been noticed on plots treated with high levels of crude BHC. No conclusions can yet be drawn.

1388. Metcalfe, J. R.
A preliminary reassessment of *Diatraea saccharalis* (F.) in Barbados, West Indies.
Trop. Agriculture Trin., 1959, **36**: 199-209, bibl. 9.

A careful evaluation of *Diatraea* infestation in 1958 showed that, whereas differences between varieties were significant, this was not the case with those between plant canes and ratoons and between fields with and without *Trichogramma minutum* liberation. It is considered that optimum parasitization by *Trichogramma* is now taking place and that liberation of artificially reared insects is no longer necessary.—Dep. Sci. Agric., Barbados.

1389. Porquez, P. H.
A preliminary report on *Trichogramma* parasites for the control of sugar cane moth borers.
Sugar News, 1959, **35**: 170-2, bibl. 5.

The mass release of *Trichogramma australicum* and *T. japonicum* in 1957 led to a marked reduction in the amount of moth borer infestation in the Philippines. An infestation percentage of 22·0 in 1956 fell to 4·60 and 4·65 in 1957 and 1958 respectively.

1390. Chen, C. B., and Hung, T. H.
Experimental results of introducing the Cuban fly, *Lixophaga diatraeae* Towns., into Taiwan, and its artificial propagation for the control of sugar cane borers. [Chinese, with English summary 2 pp.]
Rep. Taiwan Sugar Exp. Stat., 1958, No. 17, pp. 44-52, bibl. 6, illus.

Cuban flies were reared in the laboratory and, on liberation, successfully parasitized both *Proceras venusatus* and *Chilotraea infuscatella* in the field. Artificial multiplication of the parasite is made easier by using grain moth larvae as hosts.

1391. Parthasarathy, S. V.
Control of stem borer through trash mulching.
Indian J. Sugarcane Res., 1959, 3: 151-2.

Trash mulching reduced the average incidence of *Chilotraea infuscatella* in the ratoon crop from 16·52 to 7·55%.—Thiru Arooran Sugars Ltd., Vadapathimangalam, Madras.

1392. Gupta, B. D.
Insect pests of sugarcane in India—III. The top borer *Scirpophaga nivella* Fabr.
Indian Sugar, 1959, **9**: 127-49, bibl. 38, illus.

The incidence, morphology, anatomy and life history of *S. nivella* are described in detail, and 10 parasites are listed, of which 3 show promise of giving biological control. While no variety is immune from attack, eleven CoS. and eight Co. cultivars together with B.O.3 are highly resistant. Control measures recommended are collection of the egg-masses, removal of infected plants, heavy dressings of N fertilizer and the avoidance of water-logging. In the Punjab endrin at 0·1–0·2% emulsion spray showed promise in 1957, but not in 1958. [For parts I and II, see *H.A.*, 29: 4105 and 4132p.]—Indian Inst. Sugarcane Res., Lucknow.

1393. Butani, D. K.
Effect of endrin on the incidence of sugarcane leaf hoppers *(Pyrilla perpusilla* Walker).
Indian J. Sugarcane Res., 1958, **2**: 204-7, bibl. 5.

In large scale trials in Bihar spraying with 0·1 lb. actual endrin emulsion in 100 gal. water reduced the percentage of affected leaves from 4·49 to 0·61, lowered the number of egg masses per 100 leaves from 12·83 to 0·99, and the number of eggs per egg mass from 33·23 to 18·67.—Sugarcane Res., Inst., Pusa.

1394. Agarwal, R. A.
Some parasites of sugarcane scale *Aspidiotus (Targionia) glomeratus* Green.
Curr. Sci., 1959, **28**: 249-50, bibl. 3.

Anabrolepis bifasciata is considered to be of great potential value for biological control of the sugar cane scale. Parasitization reached 10–15% in May–June and September–October, 1958, at the Sugarcane Breeding Station, Coimbatore.

1395. Gupta, B. D., and Kulshreshtha, J. P.
Studies on high and low volume spraying of sugarcane I. Hand operated machines.
Indian J. Sugarcane Res., 1959, **3**: 22-8, bibl. 2, illus.

Two low volume nozzles were compared with high volume nozzles and found to be equally effective in insect kill. The fan-jet nozzle is preferred as producing a better drop spectrum with reduced volume per acre.—Indian Inst. Sugarcane Res., Lucknow.

1396. Arceneaux, L. L.
New field sprayer-duster tested in Louisiana.
Sugar J., 1959, **23**(2): 30.

The Hahn Hi-Boy can dust 125–130 acres per 10-hour day.

1397. Christie, G. A.
Unsuccessful use of the carbide gun for scaring wallabies and coots.
Cane Grs' quart. Bull., 1959, **23**: 35.

Wallabies took only 10–14 days to become accustomed to the periodic discharge of a carbide gun and coots took even less. With the wallabies a preference for Q.50 and avoidance of Trojan, Pindar, Q.58 and Q.63 were observed.

1398. Wilson, G.
Wallabies damaging cane in the Mulgrave area.
Cane Grs' quart. Bull., 1959, **23**: 28.

Showed a decided preference for Co.475 and Q.44, much less for Co.59 and avoided Pindar.

1399. Wilson, G.
An animal pest of sugar-cane.
Cane Grs' quart. Bull., 1959, **22**: 132-3, illus.

The striped phalanger; damage described but no control measures suggested.

Sugar cane—harvesting.

1400. Coleman, R. E.
Quality of harvested cane affected by trash and topping.
Sugar J., 1959, **21**(12): 9-11, bibl. 8.

In 5 experiments the inclusion of wet trash and immature upper nodes diluted the juice and increased the percentage of solids not sugar. Reducing the height of topping would increase quality without material loss to the grower.—Agric. Res. Serv., U.S.D.A.

1401. Anon.
Harvesting trend is towards chopping combines.
S. Afr. Sugar J., 1959, **43**: 629-31, illus.

Comment on the increasing use of the Cary harvester-cleaner-loader and trials of the new Massey Ferguson harvester.

1402. Perkins, L.
New harvester combine tested in Louisiana.
Sugar J., 1959, **21**(12): 12, illus.

The Cary combine, which produces chopped cane, left only 3·6% of the crop in the field, i.e. much less than conventional cutters. The trash content appeared to be high, but the samples drawn were fully representative of the cane as delivered to the mill, whereas in whole cane there is a tendency for trash to be stripped from the cane as it is withdrawn from the bundle for sampling.

1403. Knust, H. G.
A cane truck trailer.
Cane Grs' quart. Bull., 1959, **22**: 117-18, illus.

The tractor-drawn trailer described is equipped with rails, on to which full cane trucks are drawn by a winch mounted on the front of the trailer.

1404. Turner, Q. A.
Infield cane transport with Mascane trailer and side loader.
S. Afr. Sugar J., 1959, **43**: 523-5, illus.

The economies obtained by the use of a crane and by side-loading cane into Mascane trailers are described. On a 40,000-ton crop the tractor mileage saving was over 23,000 per season, and more than £4,000 in capital expenditure was saved.

1405. Morris, B. S.
The problem of moving sugarcane from wet lands by mechanical means.
S. Afr. Sugar J., 1959, **43**: 445-9.

A review of various practical methods in use.

Tea.

(*See also* 1432.)

1406. U.S. Dep. Agric., Foreign Agricultural Service.
World tea production uptrend is expected to continue.
Foreign Agric. Circ. U.S. Dep. Agric. **FTEA 1-59**, 1959, pp. 14.

Forecast for 1959 is 1,671 m. lb., 24% above average for 1950–54.

1407. Visser, T.
The position of clonal selection in Ceylon in relation to replanting.
Tea Quart., 1958, **29**: 154-9.

Of 290 clones established at the Tea Research Institute since selection began in 1938, 14 have been finally approved and others are still under investigation. It is thought that 7–8% of estates have carried out selection and that 300–400 clones are under test. The following desirable characteristics in clones are discussed: rooting ability, yield, quality and resistance to diseases and pests.

1408. Bahtadze, K. E.
A system of developing selected varieties of tea. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(1): 21-8, illus.

The importance of cross-pollination with mixed pollen from selected plants is stressed. In the progeny of open-pollinated bushes 18–20% of the plants were found to be economically valuable, whereas following pollination with mixed pollen the percentage increased to 60, and a repetition of the process resulted in over 90% of desirable plants. Selection was based on biochemical as well as physiological and morphological characteristics. Yields, weight of the plucked leaf, speed of harvesting, and tannin contents are tabulated for some recent selections. Methods of cultivation are outlined for the selected varieties, and their suitability for certain areas indicated.

1409. Hvitija, R. A.
Supplementary pollination with mixed pollen in tea seed production. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(1): 32-5, illus.

Seed yields and quality were improved by the use of mixed pollen [see also *H.A.*, 29: 3059].

1410. G[LOVER], P. M., D[UTTA], S. K., AND S[ARMAH], K. C.
Tea seed nurseries.
Ser. Tea Res. Inst. Tocklai **108/1**, 1959, pp. 7.

Practical advice on sites, selection, preparation, planting and management.

1411. BAHTADZE, K. E.
Group sowing of tea. [Russian.]
Agrobiologija, 1959, No. 2, pp. 269-79, illus.

Results are given of several experiments, conducted in Georgia, showing the superiority of tea plants raised from seeds sown in clusters over those grown singly. Space was saved in the nursery by sowing seeds in clusters of 5 or by continuous drilling, and the seedlings were taller and ready for transplanting earlier than those from seeds sown singly. A dense stand in groups or in hedges was found very suitable in a severe climate [see also *H.A.*, 28: 943] and is now also used in seed gardens.

1412. MACALPINE, R. I.
Propagation of shade tree species from root cuttings.
Two and a Bud, 1959, **6**(2): 8-9.

Root sections of *Albizzia lebbek*, *A. odoratissima*, *A. procera*, *A. richardiana*, *Dalbergia assamica*, *D. sericea* and *Derris robusta* have been used for plant production instead of seed. No success, however, was obtained with *Albizzia chinensis*. Cuttings should be struck from January to early May and given normal attention.

1413. M[ACALPINE], R. I.
Stump planting of shade trees.
Ser. Tea Res. Inst. Tocklai **23/1**, 1958, pp. 6.

Detailed advice on planting, manuring and tending.

1414. SHARMA, K. N.
Planting of tea.
Two and a Bud, 1959, **6**(2): 3-7.

Procedure recommended for Assam outlined.

1415. BARUA, D. N.
Top growth of cultivated tea.
Nature, 1959, **184**: 1424, bibl. 3.

An experiment is described in which the treatments were shade, sulphate of ammonia (100 lb. N/acre), and 12 disparate populations. Significant responses to all treatments and the shade × nitrogen interaction were observed for bush area, yield per unit of area (except the shade × N interaction), and total top growth (except for populations). Top growth per unit area of bush surface was the same for all populations provided the bushes were spaced sufficiently apart, i.e. the green weight of top growth removed from a unit area of ground was constant for all populations. Yields of plucked shoots, however, differed between populations, thus showing that the partition of growth between pruning and plucking is an important factor in tea growing.

1416. CORBERA V., J.
Abonamiento de té en la zona de Tingo Maria. (**Fertilizing tea in the region of Tingo Maria.**)
Bol. trim. Exp. agropec. P.C.E.A. Lima, 1959, **8**(3): 23-8.

In a 2-year experiment involving a 10-year-old tea plantation on a moderately fertile sandy slope guano and various inorganic NPK fertilizers (some reinforced with minor elements) were applied at the up-hill side of the plants at rates of 60, 120 and 180 kg. of N per ha. in 2 equal portions per year. Average yields per month in kg. per ha. were 481, 520 and 552 respectively, compared with 423 without fertilizer. Differences between the yields from the 3 N levels were not statistically significant, and the response was affected by rainfall and pruning. A period longer than 2 years would be necessary before making definite recommendations.

1417. CHENERY, E. M., AND SCHOENMAEKERS, J.
Magnesiun deficiency in East African tea.
E. Afr. agric. J., 1959, **25**: 25-7, bibl. 7.

The symptoms observed were a distinct, dark green, herring-bone pattern of main veins on a yellowish-green to bronze or yellow lamina, with an inverted green V at the base of the chlorotic leaf. Such leaves had less than 0·2% Mg on a dry weight basis and a K/Mg ratio above 10. Data are given for top soils under Mg-deficient bushes. It is also noted that heavy applications of ammonium sulphate have reduced Mg availability.—Agric. Dep., Uganda, and Office Produits agric. Kivu, Bukavu, C.B.

1418. STOFFELS, E. H. J.
La taille et la cueillette du théier d'Assam. (**Pruning and plucking Assam tea.**) [Flemish summary 2 pp.]
Bull. agric. Congo belge, 1959, **50**: 675-87, illus.

In the modified Assam method practised in Kivu pruning is done every 2–3 years. After this interval the plucking table is too tall for convenience, and one or more skiffs become necessary. Tipping is carried out at 90 cm. and bushes are plucked to the first rudimentary leaf. It is considered that it would be better to use the Dutch method, in which the plucking table is at 55 cm. and the bushes are plucked to the first adult leaf above the rudimentary leaf.

1419. VENKATARAMANI, K. S., AND RAM, C. S. V.
***Rhizoctonia solani* inciting a collar rot of tea.**
Phytopathology, 1959, **49**: 527, bibl. 3, illus.

Predisposing factors were deep planting and mulching close to the collar.

1420. S[ARMAH], K. C.
Violet root rot (*Sphaerostilbe repens* B. and Br.).
Ser. Tea Res. Inst. Tocklai **64/1**, 1959, pp. 4.

Detailed advice on proper drainage and shade, the only necessary control measures.

1421. Das, G. M., and Sengupta, N.
Observations on the pink mite, *Acaphylla theae* (Watt) Keifer, of tea in north-east India.
J. zool. Soc. India, 1958, **10**(1): 39-48, bibl. 17.

Following notes on injury and life history an account is given of a trial undertaken to find a non-corrosive substitute for lime-sulphur for the control of pink mite. Of 4 insecticides compared at 100 gal. spray per acre wettable sulphur at 1 lb. per 10 gal. water and Chlorobenzilate (25% emulsifiable concentrate) at 1 pt. per 62·5 gal. gave the best results, namely, average populations per leaf 2 weeks after treatment of 4·1 and 5·1 compared with 2·1 and 129·4 with lime-sulphur and the control respectively. Malathion and Aramite also gave effective control.

1422. Das, G. M.
Bionomics of the tea red spider, *Oligonychus coffeae* (Nietner).
Bull. ent. Res., 1959, **50**: 265-74, bibl. 24.

Factors affecting incidence and intensity of attack.

1423. D[as], G. M.
Control of *Microcerotermes*, a termite attacking live wood of tea.
Ser. Tea Res. Inst. Tocklai 77/2, 1959, pp. 5.

Dieldrin 1·5% dust at 133 lb. per acre, or sprays of Dieldrex 50% w.p. at 4 lb., Dieldrex-18 e.c. at 1·1 gal. or Aldrex-30 e.c. at ⅔ gal. per acre applied to the ground near the bushes are recommended. All these provide 2 lb. of toxic ingredient per acre. Dieldrin may also be used mixed with fertilizer.

1424. D[as], G. M.
Compatibility of insecticides, acaricides and fungicides commonly used in tea.
Ser. Tea Res. Inst. Tocklai **110/1**, 1959, pp. 2.

Fully and partially compatible and incompatible mixtures shown in tabular form.

1425. Virovec, O. A., and Pasynskij, A. G.
The effect of ionizing radiations upon the oxidative processes in tea and tobacco leaves.
[Russian, with English summary ¼ p.]
Biohimija, 1959, **24**: 922-8, bibl. 7, illus.

The main effect of irradiation of tea and tobacco leaves with X-rays at dosages up to 1 mil. r and with fast electrons at dosages up to 25–50 mil. r equiv. was damage to the tissues, enabling the oxidases and their substrates to come into contact without previous trituration. A 10-minute irradiation could thus replace the mechanical crushing previously required for the oxidation of tannins in the thermal fermentation of the tea leaf.

Sundry crops.

(*See also* 1211, 1470.)

1426. Ullah, M. H.
Some aspects of cultivation of falsa in West Pakistan.
Punjab Fruit J., 1958/1959, **22**(78): 1-6, bibl. 6.

Grewia asiatica.

1427. Nair, N. C., and Pillai, N. V.
Morphology of the flower and aril in *Myristica fragrans* Van Houtten.
Sci. and Cult., 1959, **25**: 211-13, bibl. 6, illus.

1428. Setty, K. G. H.
Blue mold of amla *(Phyllanthus emblica* L.).
Curr. Sci., 1959, **28**: 208, bibl. 1.

New species of *Penicillium* described; control by storage hygiene and treatment of fruits in weak borax or sodium chloride solutions.—Osmania Univ., Hyderabad.

1429. Mukherjee, D., and Khan, N. A.
A new enzyme system in the tamarind.
Nature, 1959, **184**: 1140-1.

A new polysaccharide active in the seed kernel during germination.

NOTES ON BOOKS AND REPORTS.

Books.

1430. Brooks, F. A.
An introduction to physical microclimatology.
University of California, Davis, 1959, 11 × 9 in., pp. 264, bibls, illus., $8.35.

As the author points out in his preface, this book is not primarily intended as a text-book for teaching purposes—rather it is a source-book for those desiring a working knowledge of the climate near to the ground and who wish to replace qualitative expressions of climate by defined measurements of the pertinent meteorological factors.

Dr. Brooks has divided the book into seven chapters, each with a short general introduction to the subject, followed by a number of sections developing particular facets of that subject with special reference to the physical measurements and equations necessary to define them. "General climate and weather systems" is the title of the introductory chapter, which gives the reader a broad picture of climatology. This is followed by four chapters developing microclimatological features: "Radiation", "Conduction of heat into the ground", "Eddy transfers" and "Evaporation and transpiration". The sixth chapter "Frost protection" considers various frost protection methods, including heaters and sprinklers, and the final chapter is devoted to "Descriptions of local climate and climate maps", these necessarily being confined to the United States.

Eight appendices are added, including a particularly useful one on "Dimensions, symbols and descriptions". The references to literature quoted for each chapter are placed together at the end of the book, although perhaps these would have been more convenient if given at the end of the appropriate chapter. The table of contents is particularly detailed, and the index, likewise, is a masterpiece of classification.

To the biologist and horticulturist, who is likely to be without a background knowledge of physical meteorology, the mass of equations, tables and figures and the general physical bias of the book will, no doubt, prove heavy going; nevertheless, by selective reading a good deal of useful information could be gleaned. On the other hand, for the research worker in this specialized field of climatology here is a wealth of data, gathered together from many Californian research projects, to provide much food for thought and a valuable foundation for further investigations.

G.C.W.

1431. CALLAGHAN, F. R. (EDITOR).
Science in New Zealand.
A. H. and A. W. Reed, Wellington, 1957,
8½ × 5½ in., pp. 272, illus., 22s. 6d.

In this book, prepared for the 32nd meeting of the Australian and New Zealand Association for the Advancement of Science, the reader will acquire a general background knowledge of recent progress.

J. D. Atkinson, director of the D.S.I.R.'s Fruit Research Station at Auckland, deals with fruit research. In 1957 some 21,000 acres were under top fruit in New Zealand, mainly deciduous, with a small section in the north devoted to lemons, grapefruit and sweet oranges. In addition, in recent years the cultivation of passion fruit, tree tomatoes, chinese gooseberries and feijoas has been fostered in areas relatively free from frost. The bulk of the fruit research was taken over by the D.S.I.R. in 1926 and the main Fruit Research Station at Auckland was set up in 1948. Progress is evident in many directions. The woolly aphis menace to apples was at first solved by the use of Northern Spy stocks, but at the same time it was found that when an apple tree died a replacement on Northern Spy would not grow on the same site. Before this problem became too serious the introduction of the parasite, *Aphelinus mali*, had reduced woolly aphis to negligible proportions. It was then found possible to use the standardized E.M. stocks. A nursery was set up by the N.Z. Fruitgrowers' Federation at Levin, where these stocks and selected Northern Spy stocks were, and still are, grown to provide healthy material for replanting. Co-operation between the research station and the nursery at Levin is also leading to the introduction of new apples, peach and plum varieties. Notable service has been rendered by the standardization and classified testing of therapeutants, by the determination of the extent of virus contamination in apple orchards and by work leading to the elimination of boron and zinc deficiency troubles. Manurial experiments at Appleby, in being since 1930, show that potassium is not the limiting factor in New Zealand orchards that it is in many other countries. The use of anti-fruit-drop hormones and of fruit thinning has become general practice. Work continues on the relation of soil type to tree growth, but so far the application of results has been of particular rather than general value. Continued investigations on frost problems have not yet produced any more economic method of control than oil burners. Cool storage work has shown that the optimum temperatures for storing apples and pears are higher in New Zealand than those found suitable elsewhere. With such higher temperatures an increased rate of ripening has to be accepted, but this is offset by reduction in low temperature breakdown. The possibilities of gas storing apples of different varieties are also being explored. Elsewhere in the book sections are included on such subjects as Entomology, Changed and changing vegetation, which covers the vicissitudes of *Phormium tenax*, *Leptospermum scoparium* and other species, and Science in agriculture. In this last section the benefits conferred by mechanization and by the setting up of the Fruit Board are discussed, and the successful establishment of the tobacco and hop research stations, which have so greatly benefited the cultivation of those crops, is described.

D.A.

1432. VAN DIERENDONCK, F. J. E.
The manuring of coffee, cocoa, tea and tobacco.
Centre d'Étude de l'Azote, Geneva, 1959,
11 × 8½ in., pp. 206, bibl. 18 pp., illus.

The gay cover and wealth of attractive illustrations perhaps belie the serious nature of this masterly review. Prepared for the Centre d'Étude de l'Azote, a confederation of European manufacturers of nitrogen fertilizers, this book brings together the results of fertilizer experiments and nutritional studies—not only those concerned with nitrogen—and discusses them in relation to the growing crop against a background of soils, climate and cultural methods. The result is four lucid and comprehensive essays which leave the reader with a clear picture of each crop and its nutritional status and problems. The numerous analyses and experimental results given in the text provide a great deal of valuable information, all in its proper place and with headings that make it easy to find and read. In addition, there are

summaries in English, French, German, Spanish and Portuguese each about 11 pages in length.
G.E.T.

1433. Donaldson, P. E. K., and others.
Electronic apparatus for biological research.
Butterworths Scientific Publications, London, 1958, 10 × 6½ in., pp. 718, bibls, illus., 120s.

At first sight this book appears so technical as to deter all but the bravest biologist. But the frightening array of circuits and mathematical formulae and equations mask kindly intentions, for it is the authors' purpose to enable biologists to understand the basis of electronic techniques and so appreciate their capabilities and limitations. Since all horticulturists nowadays may be expected to use electronic equipment—from the physiologist with his controlled environment to the nurseryman using controlled mist propagation methods—it behoves us to become familiar with the theory and practice of these useful tools and to have a readily available expert to turn to when we need help and advice. This very comprehensive and well-produced book supplies both these needs, and, assuming only that the reader should at least have the desire to find out how electronics tick, it can be recommended to all modern biological workers.
G.E.T.

1434. Douglas, J. S.
Hydroponics. The Bengal system.
Oxford University Press, Bombay, 3rd edition 1959, 7½ × 5 in., pp. 144, bibl. 26, illus., 12s. 6d.

The first two editions of this handbook on a simple outdoor method of soilless culture have already been reviewed in *Horticultural Abstracts* [*H.A.*, 22: 3179 and 26: 2311]. This third edition contains some additional information on recent experience and research findings, the most important being the use of Sustanum as a slow-release fertilizer. This consists of a porous carrier in which nutrient elements are embedded and which, when properly applied, will supply sufficient major and trace elements to last most crops for 6 months. Thus, like the synthetic resins, Sustanum eliminates the complications of nutrient management and has the added advantage of being cheaper. The use of urea-form fertilizers as a source of slowly soluble nitrogen is also mentioned, and some further suggestions are made on local sources of nutrients, such as activated charcoal, impregnated pine tree bark and mixtures of sawdust and oatmeal. Another new line of development briefly referred to is the soilless culture of algae as a source of protein for both human and animal consumption. The list of institutions engaged in soilless culture research has been brought up to date, and several new illustrations have been included.
P.R.-D.

1435. Holton, C. S., and others. (Editors.)
Plant pathology: problems and progress, 1908-1958.
Published for The American Phytopathological Society by The University of Wisconsin Press, Madison, U.S.A., 1959, 10 × 7 in., pp. 588, bibls, illus., $8.50.

This Golden Jubilee volume, handsomely bound in gold cloth, is a record of 10 international symposia sponsored by the American Phytopathological Society in conjunction with the American Institute of Biological Sciences. In all 62 papers, by authors from many countries, cover both the basic principles of, and significant recent advances in, plant pathology, and are grouped under the following headings: Historical and developmental aspects of plant pathology; Physiology of parasitism; Genetic approach to elucidation of mechanisms governing pathogenicity and disease resistance; Fungicides; Chemistry of fungicides; Soil microbiology and root disease fungi; Concepts and problems of nematology; Structure of viruses; Multiplication of plant viruses; and Epidemiology of plant diseases. The bibliographies provided are extensive and there are many illustrations.

1436. Howarth, W. O., and Warne, L. G. G.
Practical botany for the tropics.
University of London Press, 1959, 8½ × 5½ in., pp. 238, illus., 15s.

It may be a cliché to say that this book fills a long-felt want but it certainly does so. Anyone who has learned, or, worse still, taught botany in the tropics has experienced the irritation and frustration of trying to find local equivalents of the time-honoured examples from the British flora which are quoted in every textbook to illustrate botanical lessons. This book provides what is needed, and in it we can find tropical examples of everything we are likely to need from common types of fruits and flowers to the type genera of the cryptogams.

Apart from its particular value in the tropics it is also an excellent textbook of practical botany up to advanced level G.C.E. and for early years at the university. It is well produced and the instructions for practical work are fully and precisely worded. It is not over-illustrated, but the fairly numerous plates and diagrams are useful and clear. This book is an essential tool for the biology laboratories of all tropical schools and colleges.
G.E.T.

1437. Lawfield, W. N.
Lawns and sportsgreens.
Collingridge, London, 1959, 8 × 5 in., pp. 84, illus., 12s. 6d.

This book is intended for amateur and professional gardeners. About half of it deals with making new lawns and half with the maintenance of estabshed or neglected ones. The amateur will find ome useful tips, but there is very little of direct elp to the greenkeeper or groundsman in charge f a sports ground.

here are some obvious gaps in the text, which is ot always clear. Further, the information is ometimes incorrect or misleading, whilst the best ethods and advice are not always given. Thus, e method described of establishing seed under itumen is not correct, and in any case it is a essy, expensive and impracticable process for e prospective lawn owner. The best way of stablishing turf by stolons is not given, and the dvice (though including some useful cautions) on e purchase of seeds is not very practicable. Some f the seeds mixtures are of doubtful value. Young rass should not be allowed to grow 3 to 4 in. long nd be then sheared; light mowing is quite all ght at, say, 1 to 2 in. height.

he author in his preface says that all the controls entioned are "reliable and can be used with afety". We have found this not to be the case. hus, orthodichlorbenzene must be emulsified, is not a killer, is best used in spring, but is out-ated anyway. The strength of the DDT emul- on recommended is not given. Another example that for control of *Fusarium* disease mercuric and ercurous chlorides are recommended at a strength at will certainly kill the lawn, if not its owner! ordeaux/malachite green is not a successful ngicide against fairy rings of the *Marasmius* pe. When using formalin against *Marasmius* ngs the turf is best removed from the ring and the il dug first.

glaring inconsistency is the advice that clover ould be controlled with anti-clover mixtures, e. fertilizers high in nitrogen, yet elsewhere the ader is advised that to get a clover lawn his soil ould be rich in nitrogen and receive repeated ressings of it. R.B.D.

438. LEESE, SIR O. W. H., AND LEESE, LADY.
Desert plants—Cacti and succulents.
Collingridge, London, and Transatlantic Arts Inc., Florida, 1959, 8½ × 5½ in., pp. 220, illus., 30s.

his book brings a refreshingly new approach to e subject by way of a travelogue through the arious countries in which succulents grow wild r are extensively planted: the desert regions of orth America and South Africa as well as leading otanic gardens throughout Europe. Sir Oliver nd Lady Leese have brought back a fascinating count of how and where succulents grow and the imate and wild life of their peculiar habitats; admirable foundation for understanding the apters on cultivation that follow. These contain othing revolutionary—indeed, in the absence of uch-needed scientific research, personal experi-nce is the best guide—but are clearly written and well presented. The old unnatural separation into "Cacti" and "Other succulents" is upheld, with its inevitable complications, but Lady Leese's 50-page selection of species is arranged with the 115 genera in one alphabet, which makes for easy reference, and its value is enhanced by 71 line drawings by G. R. Kingbourn. Foremost among the collaborators is Ronald Byles, whose scholarly contributions include four distribution maps on the end-papers and much botanical data on the lesser known genera of succulents from areas outside America and South Africa.

In all, this is a book well worth having, even if you already possess several on succulent plants. The approach is novel, the style readable and the advice sound. There are an eye-catching, coloured dust jacket and 40 photographic illustrations. Presentation is good, but could be improved by the uniform use of italics in text and index for all Latin names and by numbering the plates and cross-referring to the text—at present there is little to connect the two.

Succulent plants, which have been widely decried as nature's little mistakes, the clowns of the plant kingdom, at last have a champion who is widely known and respected. With so distinguished a protagonist they may at last come to be appreciated as things of beauty rather than the petrified bric-à-brac of popular fancy. G.D.R.

1439. MAC PENNYS MIST PROPAGATION.
Mist propagation and automatic watering.
Mac Pennys Mist Propagation, Bransgore, Nr. Christchurch, Hampshire, 1959, 9 × 5½ in., pp. 60, illus., 7s. 6d.

The first section of this handbook describes the installation and maintenance of the mist propagation equipment supplied by Mac Pennys to commercial growers. Details are also given of soil warming equipment, the use of which is recommended in conjunction with mist. Initial and running costs are itemized. Rooting results obtained with cuttings of about 240 species are listed. In the second section information is given on mist propagation and automatic watering equipment designed specially for the amateur. In the automatic watering unit the amount of water applied is controlled by the rate of evaporation from a ceramic block.

1440. METEOROLOGICAL OFFICE, AIR MINISTRY.
Tables of temperature, relative humidity and precipitation for the world. Part II. Central and South America, the West Indies and Bermuda, and ***Part III. Europe and the Atlantic Ocean north of 35° N.***, 1958, pp. 53 and 159, H.M.S.O., Kingsway, London, W.C.2, 5s. 6d. and 14s.

For a description of the series see *H.A.*, 28: 3189.

1441. Money-Kyrle, A. F.
Agricultural development and research in Syria.
Agricultural development and research in Egypt.
Agricultural development and research in Turkey.
Publs Amer. Univ. Beirut **2**, 1956, pp. 56, bibl. 9 pp., illus.; **3** and **4**, 1957, pp. 268 and 202, bibls, No. 3 illus.

These well-produced books, the two larger abridged and edited by R. H. Porter, provide authoritative information on the climate, soils, people, agricultural practices and crops of these three countries. Later chapters deal with technical problems and research covering all branches of plant and animal husbandry. They contain comprehensive bibliographies and form most useful reference books for these areas of the Middle East. Each book has a section on horticulture.

1442. Moore, W. C.
British parasitic fungi.
Cambridge University Press, London, 1959, 7½ × 5 in., pp. 430, bibl. extensive in text, 45s.

Since about 1918 advisory and research pathologists of crop and other cultivated plants in this country have derived great benefits from the accumulated and accumulating records at the Plant Pathology Laboratory of the Ministry of Agriculture, Fisheries and Food at Harpenden on the incidence and distribution of the diseases occupying their attention, and of the parasitic organisms responsible for them. Hitherto this information has been available only by personal enquiry, always welcomed, from that Laboratory's privately-circulated "Monthly summary of fungus and allied diseases occurring in England and Wales", and from the periodic reviews "Diseases of Crop Plants" published by the Ministry at approximately 10-year intervals. The close association of Mr. W. C. Moore, the present Director, with this central source of information from its inception, in particular his always expanding card-index of British research on these diseases, is well known to plant pathologists, and the appearance under his name of the present work of reference, its quintessential product, has thus been eagerly awaited and will be greatly welcomed.

This compact, well-designed, produced and printed volume of some 400 pages does, in fact, provide an invaluable handbook, that will primarily be of value to the pathologist concerned with the fungi parasitic on horticultural, among other, cultivated plants, and comparable in usefulness with Willis's "Dictionary of Flowering Plants and Ferns" for the botanist, Ainsworth and Bisby's "Dictionary of the Fungi" for the general mycologist, and the various horticultural (and agricultural) dictionaries and encyclopaedias for the horticulturalist. Here, in short, between two covers is a rapid and easy guide to each parasitic fungus recorded on crop and other cultivated plants in Great Britain.

There are two alternative ways of using this book, *via* the parasite and *via* the host plant. Thus, given just a generic Latin name of a fungus suspected of parasitizing say apple trees, from the *Part II Parasites* index, which occupies most of the volume, one can rapidly trace its identification and description, its synonymy, the diseases it causes, its host range and distribution, and the principal research publications dealing with its parasitic activities and their control. Alternatively, from the Latin name of a particular economic host plant, e.g. the apple, and using first the index *Part I Hosts*, a complete conspectus of the fungal pathology of that plant can just as readily be extracted, including alternative-host relationships. This invaluable and unique Index should save plant pathologists in this country, and others also concerned with the diseases of their plants and crops, much time hitherto necessarily consumed in searching an extensive literature for scattered sources of information on their fungal pathogens.

R.V.H.

1443. Penningsfeld, F.
Die Ernährung im Blumen- und Zierpflanzenbau. (**The nutrition of flowering and ornamental plants.**)
Paul Parey, Hamburg and Berlin, 1960, 10 × 6½ in., pp. 217, bibl. 72, illus., DM 38.

Surprising as it may seem in view of the attention that flower crops and ornamental plants have commanded in other respects, their nutritional requirements have rarely been studied systematically. The author who is head of the Institute of Soil Science and Plant Nutrition at the Horticultural College and Research Station, Weihenstephan, initiated as long ago as 1948 a series of elaborate, long-term experiments, which have been carried on ever since. This book, though in some respects necessarily of a preliminary character, is the summary of his results over the period 1948-58.

Among features of special interest are many descriptions and photographic illustrations, some in colour, of symptoms of mineral deficiencies and excesses of both major and minor elements. These are coupled with an appraisal of the nutritional needs of 38 economically important crop plants. The juxtaposition of pictures of healthy plants and plants showing symptoms of malnutrition should facilitate the diagnosis of nutritional disturbances. The diagnosis of such maladies is further aided by a mass of tabulated data on the analysis of healthy and diseased plants and on the nutrients they absorb from the soil.

The book is in three parts. It begins with a short account of the experimental methods used (pp.

3–25) and then deals in detail with the nutritional requirements of individual plants arranged alphabetically (pp. 26–175). In a third part (pp. 176–17) the results are summarized in a manner which makes them readily available and of direct use to all who are engaged in the cultivation of ornamental plants both in peat and in standard soil mixtures. The printing and lay out of the book is of the usual high standard associated with the house of Paul Parey. V.H.G.

444. Rowe-Dutton, P.
Mist propagation of cuttings.
Dig. Bur. Hort. Plant. Crops, E. Malling, **2**, pp. 135, bibl. 163, illus., 10s. or $1.50.

Bayley Balfour was the first to advocate clothing leafy cuttings with a film of water, but we had to wait twenty-five years for any practical application of the idea and another twenty to get over teething troubles and the accompanying spate of reports, so voluminous as to induce mental dyspepsia in us. A similar situation had arisen when first we realized the profound effect on rooting of synthetic growth substances; we were inundated with papers. On that occasion the bureau came to our aid with Pearce's *Tech. Commun.* 12; now we have this mist propagation Digest to clarify, to point the essentials and to indicate problems awaiting our attention.

Everyone will be grateful to Miss Rowe-Dutton, not only for her clear and concise appraisal of essentials, but also for not burdening us with myriads of redundant references; 75 per cent. of the selected references are less than five years old. Yet nothing of importance is omitted. There are detailed descriptions of control systems, including various clock mechanisms, with and without moisture and heat intervention; weight and electronic governors, including Templeton's "leaf"; Monel metal bars; and ceramic blocks. The descriptions of the apparatus are adequate for any qualified technician, and for the incompetent there are addresses of manufacturers in England and the U.S. Structures, outdoor and under glass, piping, nozzles, water pressure and water quality are discussed in masterly fashion. Rooting media are dealt with in relation to those very important aspects of water application, shading, species and type of cutting used. Miss Rowe-Dutton appreciates the close relation between soil warming and root initiation and growth, but work in this field has been comparatively meagre. Leaching is related to rate of water application, and the first move should be to adjust the spray and then to consider the application of nutrients. Difficulties encountered include excessive algal development, a matter discussed when dealing with diseases and pests.

Whenever cuttings are nursed they must also be weaned, and the more thoroughly they are nursed the more careful must be the weaning. In mist propagation this is a big practical problem which has been tackled from various angles. One safe but expensive method is to pot the rooted cutting and to move it gradually into a tougher environment; progressive hardening *in situ* by reducing mist and increasing exposure has, however, proved much cheaper. Mist systems give us roots on our cuttings, but, as an earlier bureau publication [*T.C.* 14] states, the production of roots is only one step; it is important to know more about the shape, size and rate of growth of the product.

There is a most informative table of results obtained, covering well over two hundred genera, with particulars of date taken, type of cutting, growth substance treatment and environment, and the source of the information—so helpful to those seeking background information. One criticism, concerning the reference numbers in the text; these are grouped at the end of paragraphs instead of being placed with the actual comments. Thus one finds 55 numbers at the end of a 15-line paragraph, and following a sentence mentioning coffee and hevea we have 5 references, 2 dealing with cacao mentioned at the beginning of the paragraph. The familiar arrangement is more accurate and certainly less intimidating.

The development of mist techniques and consequent modification of established horticultural practices, interlocking and interacting with their new environments, will certainly continue, and a re-issue of this extremely helpful digest (may we suggest 5 years from now?) is assured of a welcome throughout the nursery trade and by all students seeking a sound guide to mist propagation. R.J.G.

1445. Simmonds, N. W.
Bananas.
Longmans, Green and Co., London, 1959, 9 × 6 in., pp. 466, bibls extensive, illus., 45s.

This is as comprehensive a review of its subject as one could hope to find in a single volume of convenient size to handle, and the author is to be congratulated on the skill with which he has packed together an extraordinary amount of information without leaving any noticeable traces of the great effort that must have gone into its compression.

The book opens with a couple of chapters outlining the vegetative and floral morphology of the banana plant and the course of its development in the field: these are good and up to date, but not otherwise noteworthy. The next three chapters, on cultivars, show more of the author's quality. They present, for the first time in a generally accessible text, a clear exposition of the rational classification of banana varieties that has been worked out over the last thirty years at the Imperial College of Tropical Agriculture—chiefly by Simmonds himself. A key to the groups is followed by a short but useful chapter on the interesting Fe'i bananas of the Pacific, and then by notes on the principal clones of the various groups in the *Eumusa* series, with a wealth of observations on synonymy far exceeding anything of the kind that has been attempted previously. These three chapters, with the separate index of clone names given at the end of the book and containing nearly 1,000 entries, constitute a systematic treatment of the edible bananas that has long been needed and, subject to minor revisions as new knowledge accrues, seems certain to be good for many years to come.

The middle chapters—almost half the book—deal with agriculture and trade, covering climates and soils, planting and management, harvest, transport and ripening, composition and utilization of the fruit, production and economics, and history. The author's treatment of these subjects is at once soundly scientific and thoroughly practical—a combination not always found in agricultural texts. Climate, for example, is dealt with by giving a careful analysis (by temperature and rainfall) of all the various climates in which bananas are grown, followed by discussion of the effects of unfavourable weather. Planting and management practices are not only described, but critically examined and related to underlying principles and local circumstances. The section on transport and ripening includes copious references to the great deal of physiological and biochemical research on which modern practice depends.

Pests and diseases receive one chapter each, and the problem of compression must obviously have been most acute here. A decision to concentrate on the three major diseases (banana wilt, leaf spot and bunchy top) and on literature published since Wardlaw's comprehensive review on banana diseases in 1935 has resulted in a really useful chapter, whereas any attempt to cover a wider range in forty pages must have led to a treatment too superficial to be worth while. For the pests, on which no monograph exists, an annotated list is given of 182 species and five are selected for fuller treatment. In the last chapter the author returns to his special field and gives a concise but adequate summary of the aims, methods and results of banana breeding from its inception in 1922 up to date.

It is not without significance that Simmonds has chosen "Bananas" as his title, whereas each of the three most important earlier books on the subject (Fawcett, 1913; Reynolds, 1927; and Kervégant, 1935) was entitled "The Banana". Those authors, though giving a general background, were most concerned with the banana of the export trade. Simmonds, without in the least under-estimating the importance of the trade, or of the very few clones on which it is based, sets these in perspective by reminding the reader that of an estimated twenty million tons of bananas produced annually in the world only about 15 per cent. enter trade. His opportunities for studying bananas in East Africa, South-East Asia and the Pacific, as well as his intensive work in banana breeding over 15 years, have qualified him uniquely to paint the broader picture; and he has taken full advantage of them. One of the many merits of his book is the extent to which it incorporates personal observation. Nevertheless, he has also done a great deal of homework in the library, and his bibliographies leave nothing to be desired.

The usefulness of the book as a work of reference is enhanced by chapter summaries, and by the condensation of information into numerous tables. The production is good, and nearly a hundred well-produced photographs really illustrate the text as well as adorn it. In short, author and publishers between them have produced a fully worthy addition to the Tropical Agriculture Series.

E.E.C.

1446. SMITH, J. D.
Fungal diseases of turf grasses.
The Sports Turf Research Institute, Bingley, Yorks, 1959, 9 × 6 in., pp. 90, bibl. 144, illus., 10s. 6d.

The appearance of this authoritative bulletin, which so competently brings together all the available information on the common diseases of turf in Britain, fills a gap in the literature and will be welcomed by greenkeepers and plant pathologists alike. The information is clearly and briefly presented and well indexed. The sections of lesser importance to the practical man are set in small type, and for the benefit of the pathologist there is a useful bibliography.

The first section of the bulletin deals with the fundamental principles of control. It gives general information on the effect of environment (moisture, temperature, soil factors and nutrients) on the incidence and development of diseases; the effect of species and varieties of grasses (with a table showing the relative susceptibility of 46 varieties to 6 diseases); the effect of various cultural practices; and finally the control of turf diseases with fungicides, with notes on fungicidal materials and methods of application, and a most useful disease control chart showing cultural and fungicidal treatments for each disease.

The second section deals with the individual diseases of sports turf and lawn grasses, the symptoms they cause and recommended methods of control. Among the illustrations is an excellent series of photographs showing the various steps in the treatment of fairy rings caused by *Marasmius oreades*. In addition to the detailed accounts given of the common diseases, brief notes are provided on diseases of lesser importance and on important turf diseases rarely or not yet recorded in the British Isles.

P.R.-D.

447. STAHL, M., AND UMGELTER, H.
Pflanzenschutz im Blumen- und Zierpflanzenbau. **(Plant protection in the cultivation of flowers and ornamental plants.)**
Eugen Ulmer, Stuttgart, 1959, 9 × 6½ in., pp. 371, bibl. 118, DM 25.

he publishers are building up a collection of ound manuals dealing with various aspects of ommercial horticulture, the present volume being ıe fifth in the series. Its authors have had long xperience in the Stuttgart Plant Protection Service nd they write with a practical bias. This is all) the good, for the readers they have particularly ı mind are the growers and their advisory officers. he topicality of the subject may be seen clearly om the German figures of recent increases in rnamental plant production, which are unfor- ınately paralleled by a corresponding increase in ests and diseases.

he book is in two parts, the first a survey of plant rotection methods and equipment (pp. 13–98) and ıe second dealing with actual pests and diseases op. 99–359). It is the latter, with its 198 clear hotographic illustrations of symptoms and para- tes, which will be most consulted by English eaders. General sections on common fungi and ests are followed by a long, alphabetical list of ost plants, together with their ailments and the ppropriate cures, which include the use of the ıore important modern chemicals. The practical alue of these recommendations is enhanced by ıtroductory paragraphs to most crops which set ut the conditions for avoiding infection or infes- ation. There is no doubt that this book has made vailable in one place a great deal of valuable ıformation, hitherto widely scattered, and it eserves a place on the shelves of every horti- ultural library.

V.H.G.

Annuals and reports.

448. BERMUDA. (GROVES, G. R.)
Annual Report of the Director of Agriculture for the year 1958, 1959, pp. 18.

uccessful control of the following pests is reported: Iediterranean fruit fly by trapping, using angelica eed oil plus DDVP; land crabs with baits composed of bran, dieldrin, salt and water; the giant ug, *Amalia gagates*, with a proprietary product ontaining metaldehyde; and the bulb mite of ermuda lilies, *Rhizoglyphus solani*, by dipping the ulbs in 1 in 3,200 corrosive sublimate for ½ hr. t 70° F.

449. BOSKOOP. (DORSMAN, C.)
Jaarboek Proefstation voor de Boomkwekerij te Boskoop, 1958. **(Yearbook of the Boskoop Tree and Shrub Nursery Experimental Station for 1958)**, pp. 128, illus.

everal of the articles have been abstracted separately and are included in the Floriculture section. At the beginning of the report there is a description of the new glasshouses by the Director. Other reports include: *Propagation:* of *Chaenomeles* by root cuttings; the use of low-tension soil heating for rooting rhododendron cuttings; the effect of a cold grafting wax on lilac and cotoneaster growth; rootstocks suitable for *Rosa* "Persian Yellow" (*R. rugosa* promoted the best growth); and 4 *Syringa* species being tested as stocks for lilac varieties. Reports are also included of work at the I.V.T., Wageningen, on the propagation of fruit tree rootstocks and of blueberries. *Diseases and pests:* soil drenches of AAfuma or captan reduced wilt infection in clematis; *Cercospora* leaf spot of rhododendron was satisfactorily controlled by Polyram 0·4% (an organic mercury compound); control of mildew in roses and gooseberries; and selection of virus-free plums, peaches, almonds and peonies. *Breeding:* hybridizing of azalea, cotoneaster, *Cytisus*, hydrangea, *Ilex*, *Potentilla*, rhododendron, lilac and *Diervilla*; colchicine treatment of clematis; and ionizing irradiation of clematis and forsythia. *Soil and nutrition:* media for rooting cuttings; and Ra-pid-gro as a quick-acting nutrient. There are also separate articles on forcing forsythia by cold treatment, the effect of the moon on sap-flow, and of gibberellin on nursery crops.

1450. BRITISH GUIANA.
Annual Report of the Director of Agriculture for the year 1958, pp. 58.

Includes progress reports on trials carried out with sugar cane, coconuts and citrus.

1451. CAMEROONS DEVELOPMENT CORPORATION.
Annual Report of the Cameroons Development Corporation for the year 1958, Victoria, 1959, pp. 31, illus.

Bananas: compound fertilizers plus earthing-up increased bunch weight and reduced losses from wind and borers. *Oil palms:* crown disease attributed to Mg deficiency.

1452. COMMERCIAL GROWER.
The Commercial Grower Handbook and Diary, 1960.
Benn Bros., Fleet St., London, 1959, 9 × 6 in., pp. 340, 21s.

Packed with every useful type of information on top and soft fruit, vegetables and flowers. There are guides on marketing, manuring, plant protection, advisory services, official bodies and many other things a grower is likely to wish to know.

1453. DEUTSCHE AKADEMIE DER LANDWIRTSCHAFTSWISSENSCHAFTEN ZU BERLIN. (PLACHY, E.)
Jahrbuch 1957/1958. **(Yearbook 1957/58 of the German Academy of Agricultural Sciences in Berlin.)** 1959, pp. 541, bibls.

In the introductory chapters the organization of agricultural research in Eastern Germany is explained. The main part of the yearbook consists of reports from 39 individual research institutes (pp. 124–500), giving data on staff and work in hand and supplying lists of papers published. The institutes at Grossbeeren, Dresden-Pillnitz and Marquardt are purely horticultural, while others, such as the Biologische Zentralanstalt, Berlin, and the Institute für Phytopathologie at Aschersleben and Naumburg, deal with certain aspects of horticulture in conjunction with other work. Breeding of horticultural crops is carried out at a number of institutes.

1454. DIRECTIE VAN DE LANDBOUW, 's-GRAVENHAGE.
Tuinbouwkundig Onderzoek, Jaarverslag 1958. **(Horticultural Research, Annual Report, 1958)**, Ministry of Agriculture, The Hague, pp. 351.

The reports are classified under crop subjects. Results given should be regarded as provisional.

1455. FAO.
Production Yearbook 1958, Vol. 12. [English, French and Spanish], Rome, 1959, pp. 475, $4.50 or 22s. 6d.

Previously called *Yearbook of Food and Agricultural Statistics, Part I, Production.*

1456. FAO.
Report of the Council of FAO. Twenty-ninth Session, 27 October–7 November 1958, and ***Thirtieth Session, 15 January 1959,*** FAO, Rome, 1959, pp. 115.

Including discussions on the world agriculture situation, current FAO activities and future development.

1457. FIJI.
Annual Reports of Divisional and Specialist Officers, 1957, Department of Agriculture, Fiji, being *Bull.* **34**, Suva, pp. 106, 4s.

Departmental work includes: Cacao development; investigations on banana leaf spot and scab moth control, manuring and spacing; cacao fermentation; copra drying. Entomological services include work on the biological control of rhinoceros beetles (*Oryctes rhinoceros*), banana scab moths (*Nacoleia octasema*), small coconut leaf moths (*Agonoxena argaula*) and several weeds. The biology and control of the rose beetle (*Adoretus versutus*) on cacao and other crops have also been studied.

1458. HAWAII.
Statistics of Hawaiian agriculture, 1958.
Agric. Econ. Rep. Hawaii agric. Ext. Serv. **38**, 1959, pp. 58.

General data, prices, shipments, crops and livestock.

1459. INDIAN AGRICULTURAL RESEARCH INSTITUTE.
Scientific Reports of the Indian Agricultural Research Institute for the year ending 30th June, 1955, 1957, pp. 129, bibl. 108, Rs. 7.50 or 11s. 6d., [received 1959].

Including varietal trials and plant protection studies with tropical vegetables.

1460. INSTITUUT VOOR BEWARING EN VERWERKING VAN TUINBOUWPRODUCTEN, WAGENINGEN.
Annual Report 1956-1957 of the Institute for Research on Storage and Processing of Horticultural Produce [in English], pp. 64, illus. [received 1959].

At least half of this report is concerned with problems of fresh produce, and the following are some of the subjects discussed: Determination of apple and pear maturity with the aid of a photovoltmeter; mechanical injury to tomatoes during picking; size-grading machines for tomatoes; wax coating of tomatoes, melons and cucumbers; injury to strawberries during harvesting; various packages for soft fruits, peaches, apples and pears; gas storage of soft fruits and vegetables; cold storage of brussels sprouts, grapes and celeriac; disinfection of grapes with SO_2; gas storage of grapes; cold storage of cauliflowers; the relations between first bloom, time of picking, and keeping quality of apples and pears; gas storage of apples and pears; delayed post-harvest cooling of apples and pears as affecting storage quality; deterioration of apples and pears as affected by storage conditions, storage period and packages; use of impervious linings in fruit boxes; cold storage of perennial ornamental plants; storage diseases, viz. bitter pit, Jonathan spot and scald; physical observations in stores; and the vitamin C content of apples during storage and comparison with the vitamin C content of oranges.

1461. INSTITUUT VOOR PLANTENZIEKTENKUNDIG ONDERZOEK, WAGENINGEN.
Jaarverslag 1958. **(Annual Report for 1958 of the Institute for Plant Pathological Research, Wageningen.)** [English summary 7¼ pp.], 1959, pp. 162, illus.

Investigations on pests and diseases of horticultural crops are reported under the following headings: *Entomology. Strawberry:* control of *Pentatrichopus* in the field reduced virus spread; control of *Tarsonemus* by post-harvest sprays of endrin, Thiodan or Kelthane. *Apple:* parasitism of woolly aphid; control of *Orthosia* spp. by N 1240, Perthane or Rhothane; combined chemical and biological control methods for orchard pests; the build-up of resistance of red spider mites to organic phosphorus materials. *Raspberry:* control of *Macropsis fuscula* reduced the spread of rubus stunt; control of *Thomasiniana theobaldi* by removal of May shoots was followed by considerable increases in eld. *Cherry:* rosette virus is considered to be oil-borne. *Black-currant:* control of *Phytoptus* ites by endrin. *Vegetables:* control of *Chortohila brassicae* on brussels sprouts by 2–3 sprays of eptachlor; control of *Napomyza lateralis* in hicory roots by parathion or Diazinon; peas were rotected from *Sitona lineatus* and *Acrythosiphon isum* by Thimet, and *Kakothrips* larvae were ontrolled by parathion. *Mycology and bacriology. Apple:* guanidine (Cyprex) and AAcuram ave successful curative control of scab in inoculaon tests; *Podosphaera leucotricha* may be conolled by regular sprays of Karathane; captan was est for control of collar rot (*Phytophthora cactorum* ad *P. syringae*) in the laboratory. *Stone fruits:* olybdenum sprays applied to young cherries nfected with bacterial canker improved tree condion; iron sulphate and salicylic acid were promising or silver leaf control. *Vegetables:* for gherkins neb or maneb gave good control of *Glomerella genarium*, and Karathane controlled *Erysiphe choracearum*; disinfection by captan or thiram of opium poppy seeds controlled *Pyrenophora alvescens. Virology.* Meristem culture of caration and delphinium. Studies on virus iseases of strawberries, currants, raspberries, herries, peas, lettuces, tobacco and seed carrots. *ematology.* Population studies. *Disease resisance.* Studies on resistance of cucumbers to *orynespora melonis*, of beans to viruses, of peas o *Fusarium*, pea yellows and Mn deficiency, and of omatoes to corky root. *Economic use of pest ontrol materials and the agricultural air service.* erial applications to crops, including beets, peas nd sprouts; a method for colorimetric analysis of ithiocarbamate residues on glass and leaves; eterminations of swath-width and spray patterns ith different helicopter equipment; studies on the ncreasing phytotoxicity of heptachlor and thioheton residues with increasing droplet size and oncentration. *Air pollution.* Damage to hortiultural crops by fluoride and sulphur dioxide ases. Injury by chromic acid and by hydrochloric cid was also reported.

462. INSTITUUT VOOR TOEGEPAST BIOLOGISCH ONDERZOEK IN DE NATUUR, ARNHEM.
Werkzaamheden in 1958. **(Annual Report of the Institute for Biological Field Research, Arnhem, for 1958.)** [English summary 2 pp.] *Meded. Inst. toegep. biol. Onderz. Nat.* **44**, 1959, pp. 40, illus.

or work on windbreaks see abstract 11.

463. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.
Jaarverslag 1958. **(Annual Report of the Institute of Horticultural Engineering, Wageningen, 1958)**, 1959, pp. 64, illus.

he research section contains reports and results of the following studies: Comparisons of various types of glass and plastic film for frame crops; artificial light for tomato seedlings and adult plants; glasshouse climate (temperature measurements throughout houses with different heating systems); comparisons of 4 glasshouse heating methods; electric soil heating for glasshouse tomatoes and frame-grown strawberries; an electronic leaf for misting control; soil disinfection by electrocution; comparisons of various soil amendments on soil structure; soil management for apples and pears; soil compaction by wheeled implements; a type of winch for use with a small tractor; post anchorage; a spiked roller; night frost protection by smoke and mist; work methods and organization on bulb holdings; a picking pail for fruit; and a small work platform for fruit picking.

1464. I.R.S.I.A.
Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture. Rapport annuel. Exercice 1958. **(Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture for 1958)**, Brussels, 1959, pp. 233.

Brief summaries are given of work on orchard nutrition and chemical thinning of fruits, on tobacco (varieties, nutrition and drying), on diseases of lettuce, on flower biology of chicory and asparagus, and on the uses of electricity in horticulture (soil heating for chicory and azaleas, extra light for ornamental pot plants).

1465. KENYA.
Annual Report of the Department of Agriculture, 1958, Vol. 1, 1959, pp. 62, 4s.

Brief research reports include: *Coffee:* Biology and control of the tip stem borer *Eucosma nereidopa* and chemical control of the leaf miners *Leucoptera meyricki* and *L. caffeina.* Nutritional work has been concentrated on deficiency or unbalance of magnesium. Of the usual four spray applications against rust, *Hemileia vastatrix*, the January treatment could be omitted under certain conditions. Captan formulations have proved effective against berry disease, and times of treatment have been determined for different areas. At 72° F. internodal cuttings rooted more quickly than nodal ones. In a trial of composts for cuttings a mixture of $\frac{1}{4}$ vermiculite, $\frac{1}{4}$ coffee hulls and $\frac{1}{2}$ coarse sand gave the best results. In one experiment at Ruiru there was a valuable yield response to mulching. *Pyrethrum:* Breeding and phosphate nutrition. *Sisal:* Nutrition, rate of leaf production, weed control, cover crops. *Sugar cane:* Varieties and nutrition. *Horticulture:* Export of citrus fruits; pineapple suckers as planting material; strawberry growing for export; determination of the cutting period of asparagus by soil temperature rather than by date; tomato varieties.

1466. LONG ASHTON.
Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, Bristol, 1958, 1959, pp. 188, bibls, illus.

Most of the research papers contained in this report have been abstracted separately. Other papers not abstracted concern virus diseases in cider orchards, the determination of residues of γ-BHC and microgram quantities of dieldrin, the uptake of fungicides by fungal spores, the metabolism of aromatic compounds by fungi, the fungitoxicity and phytotoxicity of some petroleum oils, a survey of species of leafhopper (*Erythroneura* and *Typhlocyba* spp.) on apples, a prototype low-pressure twin-fluid atomizer, and studies on the microbiology of cider making.

1467. MAURITIUS.
Annual Report of the Department of Agriculture for the year 1957, 1959, pp. 63, R 1.

Numerous crops are discussed in the general review, and special chapters are devoted to the tea, fibre and tobacco industries. The report from the Experimental Stations gives a brief account of work in progress. The Plant Pathology section deals with diseases of plantation crops, especially sugar cane, of vegetables and of certain ornamentals, and the Entomology section is largely concerned with biological control.

1468. METCALF, R. L. (EDITOR).
Advances in pest control research, Vol. II.
Interscience Publishers, Inc., New York, 1958, 9 × 6 in., bibls, illus., 94s.

This review contains the following papers of interest to horticulturists: Innate toxicity of fungicides, by S. E. A. McCallan and L. P. Miller; Research advances in seed and soil treatment with systemic and non-systemic insecticides, by H. T. Reynolds; Isotope dilution techniques for the determination of pesticide residues, by C. T. Redemann and R. W. Meikle; The relation of chemical structure to activity for the 2,4-D-type herbicide and plant growth regulator, by R. L. Wain; and The spread of insecticide resistance in pest species, by A. W. A. Brown.

1469. NIGERIA, EASTERN REGION.
Annual Reports of the Agricultural Department, Eastern Region, 1956-57 and ***1957-58,*** Enugu, both pp. 38, illus., 1s. 6d. each.

Extension work, and investigations embracing vegetables, citrus and cacao.

1470. NIGERIA, FEDERATION.
Annual Report on the Department of Agricultural Research for the year 1957-58, Lagos, 1959, pp. 43, 9d.

Citrus: Cleopatra tangerine proved the best rootstock in trials with the Agege I sweet orange. *Coffee:* Quillou robusta yielded better than other varieties. Coffee berry borer incidence on *C. excelsa* was only 20–30% of that on *C. canephora*. *Kola:* Hybrids from crossing pink and red parents gave the highest, and those from white nut parents the lowest, yields.

1471. NIGERIA, WESTERN REGION.
Annual Report of the Department of Agriculture, Western Region, for the year 1953-54, 1959, pp. 49, 9d.

The report by the Cocoa Division includes investigations on swollen shoot disease.

1472. NORMAN, A. G. (EDITOR).
Advances in agronomy, Volume XI.
Academic Press, New York and London, 1959, 9 × 6 in., pp. 428, bibls, illus.

The main subject in this year's volume is fertilizers, their economics, production and use, including the effect of N on P availability. Other sections deal with water in relation to soils and crops, agricultural machinery, and land use in the Netherlands.

1473. NYASALAND.
Annual Report of the Department of Agriculture for the year ended 31st December, 1958 (Part I), 1959, pp. 34, illus., 4s. 6d.

Administrative report.

1474. NYASALAND.
Annual Report of the Department of Agriculture for the year 1957/8 (Part II), Zomba, 1959, pp. 155, 7s.

Tobacco: variety, cultural and fertilizer trials of dark tobacco; variety trial and production of "colour" (light cinnamon cigarette-type) leaf in burley; fertilizer and time-of-planting trials of Turkish tobacco; pest and disease control; chemical analyses. *Tea:* see *H.A.*, 29: 3049. *Tung:* production of improved planting material, fertilizer trials, oil analyses. *Coffee:* cultivation and manuring experiments; variety trials; pest and disease control; micronutrient studies. *Fruit:* strawberry variety and cultural trials; trials with deciduous fruits and citrus.

1475. ONTARIO DEPARTMENT OF AGRICULTURE (VINELAND).
Biennial Report of the Horticultural Experiment Station and Products Laboratory, Vineland Station, for 1957 and 1958, pp. 161, illus.

Several of the papers in the Experiment Station report have been abstracted separately. In addition, the report deals with packing fruits and tomatoes, 3 new cherry varieties, peach breeding, 2 early tomato varieties, a leaf-mould resistant omato (V548), and rhododendron and holly rials.

476. QUEBEC POMOLOGICAL AND FRUIT GROWING SOCIETY.
Annual Report of the Pomological and Fruit Growing Society of the Province of Quebec, 1958, 1959, pp. 75.

ncluding articles on apple marketing, insecticides or apple pests and organic fungicides for apple cab control.

477. QUEBEC SOCIETY FOR THE PROTECTION OF PLANTS.
Fortieth Report of the Quebec Society for the Protection of Plants 1958, 1959, pp. 152, bibls, illus.

ee separate abstracts in Plant protection and Weed ontrol sections.

478. ROSEWARNE (N.A.A.S.).
Fourth report of Rosewarne Experimental Horticulture Station and Ellbridge Sub-station, 1958, Camborne, 1959, pp. 95.

ork on anemones, brassicas and three bulb rops has been abstracted separately. The report lso includes sections on the following subjects: *ruit:* Strawberry variety trials; a comparison of loche types for covering strawberries in winter lastic cloches had to be abandoned because of igh winds); black-currant, apple and rhubarb ariety trials. *Other flowers:* A study of many rysanthemum varieties with data on their ropping period; flower growing under a mobile asshouse; date of sowing gypsophila; stock ials; violet nutrition; *Chrysanthemum maximum* arieties. *Other vegetables:* Trials with 5 tomato arieties; lettuce nutrition; trials with 5 maincrop eetroot varieties; nutrition of beetroot, runner eans and broad beans. *Protected cropping:* egetable growing under Dutch lights and different pes of cloche. *Work at Ellbridge Sub-station:* or the control of narcissus bulb fly the cold dip f 0·2% aldrin must still be preferred to dieldrin; rther trials are necessary before the use of emicals in the drills can be advocated. Downy ildew of anemone was controlled effectively ith 4% formaldehyde ($\frac{2}{3}$ gal./sq. yd.) at much wer cost than with sodium-m-dithiocarbamate. ther studies include: the lasting qualities of rysanthemum blooms following 4 pre-marketing eatments; data on 6 new chrysanthemum varieties; rawberry variety trials; and protected cropping of owers and vegetables.

479. SEYCHELLES.
Annual Report of the Agricultural Department for 1958, pp. 22.

dministrative report.

1480. SUMATRA PLANTERS' ASSOCIATION.
Annual Report of the General Experiment Station of the A.V.R.O.S., December 1956-November 1957, being *Bull. Res. Inst. S.P.A.* **25**, 1959, pp. 5.
Annual Report of the Research Institute of the Sumatra Planters' Association (ex AVROS), being *Bull. Res. Inst. S.P.A.* **26**, 1959, pp. 6.

Short administrative reports.

1481. SURINAM.
L.V.V. in 1957. Overzicht van de verrichtingen van het Departement van Landbouw. Veeteelt en Visserij in 1957. **(A survey of work of the Department of Agriculture, Stock and Fisheries in 1957.)**
Surinaam. Landb., 1958, **6**: 107-81 + tables, illus.

Citrus: Manuring on sandy soils. *Bananas:* Small scale manurial trials. *Cacao:* Control of *Phytophthora* pod rot, clonal trials. *Coffee:* Manurial and clonal trials started. *Trade:* Export and production figures are given for the principal crops.

1482. TANGANYIKA AGRICULTURAL CORPORATION.
Report and Accounts of the Tanganyika Agricultural Corporation for 1956-1957, Dar es Salaam, 1958, pp. 137, illus., Sh. 12/50.

Tobacco fertilizer experiments showed a profitable financial return on either 0·75 or 1·5 cwt. K_2O plus 0·3 cwt. N. There was no response to P. In a variety trial Hicks was clearly superior.

1483. TRINIDAD AND TOBAGO.
Administration Report of the Agriculture Department for the year 1956, 1958, pp. 76, $1.25 (T'dad).

Work briefly reported includes: *Sugar cane* variety trials; *Cacao* breeding and selection for witches' broom resistance; containers for growing rooted cuttings; pests and diseases; *Citrus* transplanting and tree management trials; epiphyte control by 2,4-D (with partial success); melanose spotting of grapefruit (*Diaporthe citri*); *Mango* propagation; *Banana* leaf spot (*Mycosphaerella musicola*) and moko disease (*Pseudomonas solanacearum*) and various pests; *Coconut* selection and pests and diseases.

1484. UGANDA.
Annual Report of the Department of Agriculture for the year ended 31st December, 1957, Entebbe, 1959, pp. 56, illus., 5s.

Sugar cane: Heat treatment against ratoon stunting disease gave a 36·5% increase over a control yield of 27·4 tons of cane per acre. Treated cane had more nodes, longer inter-nodal length and greater girth but no greater weight of individual canes. Losses attributable to the disease appeared to be due to reduced tillering. *Coffee:* Couch grass

(*Digitaria scalarum*), regenerating after cultivation, was largely controlled by 5 and 10 lb./acre dalapon in 60 gal. water. Investigations into self-incompatibility in robusta showed 25% average set for selfs and 57% for out-pollinations. This high rate of self-compatibility is at marked variance with results obtained with robusta elsewhere. In arabica variety trials the Kenya selection K.7 showed the greatest rust resistance, and this variety and the Tanganyika varieties K.P.162 and 423, N.39 and C.40 were the highest yielders. Control measures are reported for the mealy bug *P. latipes*, biting ants and the capsid *Lycidocoris mimeticus*.

1485. WILHELMINADORP.
Jaarverslag 1958, Proefstation voor de Fruitteelt in de Volle Grond, Wilhelminadorp (bij Goes). (**Annual Report, 1958, of the Experiment Station for Fruit-growing in the Open, Wilhelminadorp (near Goes).**) [English summary 6 pp.], pp. 93, illus.

The results of experimental studies have been abstracted separately.

New periodical.

1486. TURRIALBA.
Coffee [*Coffee, Turrialba*] [1959], Vol. 1, No. 1, 10½ × 8 in., pp. 22, from Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

This new journal is published by the Scientific Communication Service of the Inter-American Institute of Agricultural Sciences of the Organization of the American States. It is edited by the staff of Coffee and Cacao Technical Services, Plant Industry Department, and distribution is free through the U.S. Operations Missions in Latin America. There is also a Spanish edition named *Café*. The publication will be issued quarterly and will include original reviews and articles on coffee, reproductions and translations of specially interesting articles published elsewhere, summaries of annual reports from research stations where coffee is studied, a limited number of abstracts of important matter published elsewhere, and news and notes.

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